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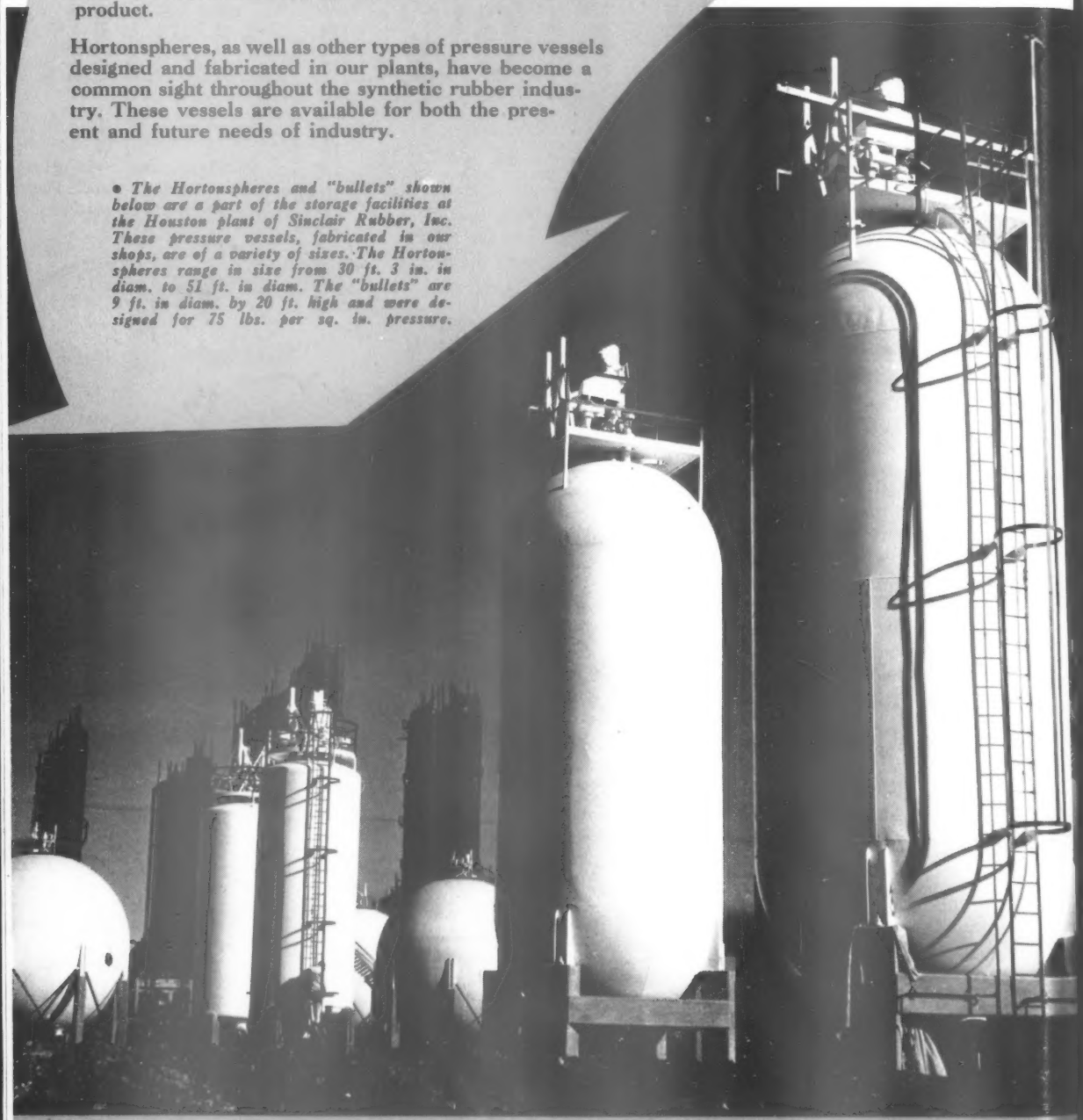

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Trends

Crude-Oil Production
By States—Page 118

CRUDE-OIL STOCKS 222,874,000 bbl. as of October 14—up 374,000 bbl. One year ago 233,997,000 bbl.

GASOLINE STOCKS 78,506,000 bbl. as of October 14—down 48,000 bbl. One year ago 67,651,000 bbl.

RESIDUAL FUEL-OIL STOCKS 64,365,000 bbl. as of October 14—down 279,000 bbl. One year ago 65,689,000 bbl.

GAS OIL AND DISTILLATE STOCKS 47,335,000 bbl. as of October 14—up 1,257,000 bbl. One year ago 41,747,000 bbl.

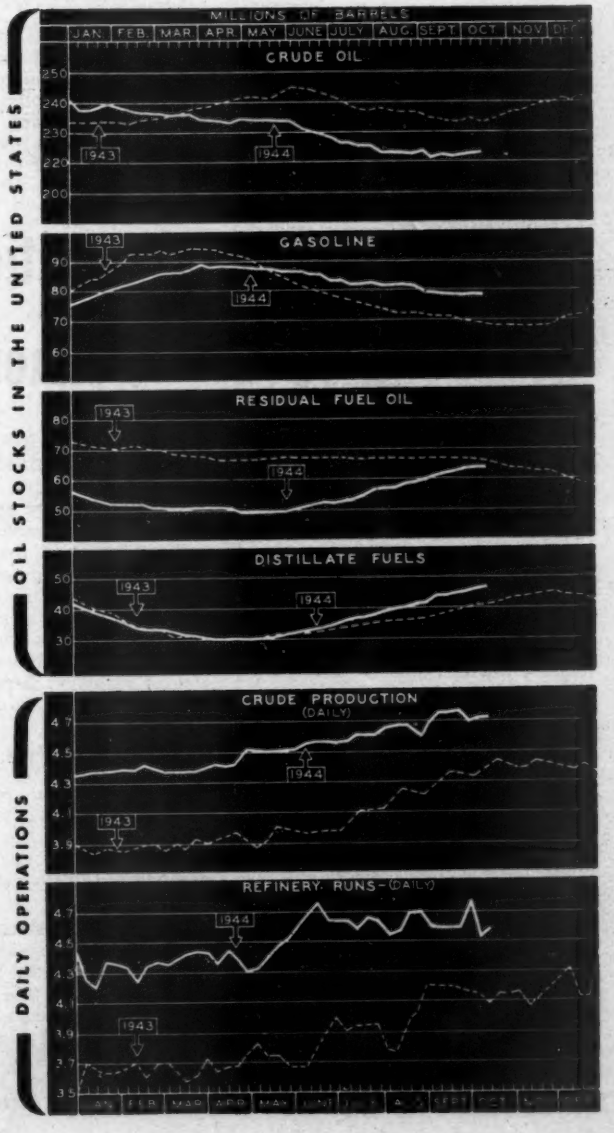
CRUDE-OIL PRODUCTION 4,740,000 bbl. as of October 21—up 18,350 bbl. One year ago 4,415,000 bbl.

REFINERY RUNS 4,589,000 bbl. daily week ended October 14—up 83,000 bbl Year ago 4,191,000 bbl.

THE results of the expanded petroleum operations of Latin-American countries are apparent in domestic developments and in trends applying to all oil activities of the United Nations. The current crude-oil output of producing areas to the south totals approximately 1,150,000 bbl. daily, an all-time peak and about 50 per cent greater than the output during 1942 when the enemy's submarines disrupted shipping operations. Venezuela accounts for two-thirds of the total output of South America, British West Indies, and Mexico with a reported output slightly in excess of 800,000 bbl. daily. Colombia has also expanded its production to 65,000 bbl. daily. Except for Venezuela and Colombia present production is near capacity. Other estimated daily production is: Trinidad, 60,000 bbl.; Argentina, 62,500 bbl.; Peru, 40,000 bbl.; Mexico, 105,000 bbl.; Ecuador, Bolivia, Brazil and Cuba, 10,000 bbl.

IT is expected that the Latin-American countries exclusive of Mexico can further expand their production to approximately 1,200,000 bbl. by the end of the first quarter of 1945, which was the objective early this year of the Allied petroleum administration. Most of this increase will come from Venezuela which has new pipe-line facilities under construction in Eastern Venezuela which will provide new outlets for more than 100,000 bbl. daily in that important oil-producing section. Some increase in the low-gravity fields of the Lake Maracaibo area is probable should the demands for that grade of crude oil increase. In Colombia greater production from the Barco concession and other areas will increase daily output to around 80,000 bbl. daily within a few weeks.

THE enlarged South-American production is given in explanation of the leveling off in domestic production starting in September. The large output of low-gravity crudes in the Lake Maracaibo fields of Venezuela, now totaling about 550,000 bbl. daily, has taken care of the increasing war demands for residual fuels which refiners in the United States had difficulty supplying in 1943 and 1942 and the early part of this year. The Eastern Venezuelan fields have supplied the increasing output which the Caribbean refineries needed in the production of war products and through imports have also supplemented domestic supplies of this country.



DPC's Briefalog Leaves Many Important Questions Unanswered

by Henry D. Ralph

WASHINGTON. — Considerable misunderstanding may result from the wide distribution the Defense Plant Corp. is giving its booklet listing oil refineries and other war plants to be sold by it, despite the notice on the flyleaf that their disposition is subject to present contracts and the length of the war.

The oil refineries listed, like the synthetic rubber and most of the other types of DPC facilities, will not be sold until the war ends in the Pacific, though proposals to purchase them then will be considered by DPC now. Moreover, the present lessees and operators of these refineries frequently have options to purchase them after the war, and this right may or may not be exercised at that time.

Another complication is that the newly enacted Surplus Property Act puts many restrictions around the sale of these refineries, and the Surplus Property Board has not yet been appointed to carry out this procedure.

Many of the DPC 100-octane plants are not complete units by themselves and could hardly be operated except in conjunction with privately owned refineries with which they are now connected, and therefore they may be of little value to anyone except their present lessees.

Hope for Postwar Conversion

The object of DPC in circulating this list, which it describes as a "Briefalog," is to stimulate interest in the postwar use of the several hundred industrial plants and sites which it owns. Some types of plants have already been abandoned as war projects, including a number which were only partially completed before the contracts were cut back, are available for immediate purchase, but no oil refineries are in this class. It is DPC's hope that as many as possible of these war plants will be converted to some commercial purpose by private industry very shortly after their war use ceases. Where negotiations can be concluded in advance the process of reconversion will be greatly speeded.

The "Briefalog" now being distributed is not complete, and a considerable number of industrial facilities remain to be listed in a later supplement. For example, only three of the DPC oil pipe lines are listed. The big-inch lines operated by War Emergency Pipelines, Inc., are not included. This has no particular significance, since the Government has not yet determined a policy for disposition of any of its pipe lines.

In the new law Congress imposed special requirements for the disposal of certain classes of government-owned property which cost $5,000,000 or more, including aviation-gasoline plants and facilities and pipe lines and facilities used for transporting oil. A report must be made to Congress on each such facility giving its description, the economic problems involved in its post-war use, and a plan for its disposition. Such a plant may be leased for a period up to 5 years, but may not be sold until Congress has had an opportunity to review the proposal.

Any negotiations for disposal of a plant which cost the Government $1,000,000 or more must be reported to the attorney general, who will have 90 days to determine whether or not the sale would violate the antitrust laws.

Certainly the synthetic-rubber plants and the big pipe lines, and quite likely many or all of the DPC 100-octane plants, will not be finally disposed of until Congress and various Government agencies have debated and discussed at great length all possible economic and political effects of any proposed sale. This might mean that the present operators would continue to lease the facilities for some time after the end of the war if they have any economic justification to use them.

Although the oil industry has been well aware of the refineries owned by DPC, publication of this listing, DPC believes, may stimulate proposals for their postwar disposition. It could result in brisk bidding within the industry or in startling proposals from unexpected sources, or it might spur the present operators of the plants to begin negotiations for their future purchase.

Opposition to Oil Pact Spreads Among Texas Operators

HOUSTON. — At a meeting here October 18 attended by approximately 150 Houston oil men, Ralph T. Zook, president of the Independent Petroleum Association of America, said that if the Anglo-American petroleum agreement, now before the U. S. Senate, is ratified it will be another step to undermine constitutional government and will pave the way to federal control over the oil industry, disrupting the very essentials of a sound national oil policy.

At the conclusion of Zook's address, a motion by Glenn H. McCarthy, Houston, resulted in the unanimous acceptance by Houston independents of the recent resolutions adopted at Dallas which condemned the ratification of the agreement.

Ralph A. Johnston, vice president of the I.P.A.A., presided at the meeting and George A. Hill, Jr., president of Houston Oil Co. of Texas, introduced Zook.

In an opening blast at the proposed treaty Zook said that "No such agreement or treaty should be made or ratified which includes provisions that could properly be interpreted as authorizing any invasion by the federal Government, or any agency created by such an agreement, of the rights and the duties of the states in administration of their control over the production of our natural resources, or invasion of the control of the Congress of the United States over the importation of natural resources."

Zook added that if the industry is subjected to cartel controls, such as the Anglo-American agreement, its progress will not only be halted but will result in the complete end of state regulation.

Touching upon the effect of such agreement, if ratified, Zook said that at this time the crude-oil price situation is more important than at any other time in the war period.

"The oil demand will not lessen at the end of the European war. The load will only shift to the Pacific theater. The demand for oil and products for the first quarter of 1945 is estimated to be 5,500,000 bbl. daily as compared to present production of liquid petroleum of 5,000,000 bbl. daily, and this demand can only be

Ralph T. Zook, president of the Independent Petroleum Association of America (standing), attacks the proposed Anglo-American oil agreement at Houston. Russell B. Brown, general counsel of the I.P.A.A. is at Zook's right, and at his left is Glenn H. McCarthy, cochairman of the National Opposition Committee. (Marguerite Campbell Photo)

furnished by reducing inventories of these products to dangerous levels."

Russell B. Brown, general counsel for the I.P.A.A., with headquarters in Washington, declared that in addition to the Anglo-American treaty the independent oil operator is confronted with other problems.

Federal Threat Continues

"The fact that the oil industry won a recent fight to prevent government retention of minerals underlying properties owned by the federal Government does not end the threat. The federal Government now owns almost one-fourth of the total acreage within continental United States," he said.

In a recent bill providing for disposition of surplus properties, a provision was inserted by the Senate authorizing the Government to withhold minerals under United States properties being sold. The House refused to approve this provision and it was stricken at conference.

Brown said that there are many in high government authority who wish to renew this fight and the industry and the sovereign states have much at stake and must continue to be alert to the danger of this threat. He also pointed out that there is pending in Congress a resolution authorizing the Federal Power Commission to make certain extensive studies of the supply and production of natural gas.

"The FPC anticipating this permission is already seeking information regarding the gas industry. If this federal agency can control the production of gas, it thereby has control and regulation over the production of oil because there isn't a barrel of oil produced in which there isn't some gas in solution. This is just another backdoor approach to control of the oil industry."

At the conclusion of Brown's address, McCarthy, cochairman of the national committee of oil operators opposed to the ratification of the Anglo-American pact, said that the close of this meeting was by no means the end of the responsibility on the part of I.P.A.A. members. "The individual action of every gentleman present is of vital importance in the ultimate defeat of this issue," he said.

State-Wide Committee Plans Strong Campaign

AUSTIN.—Plans for carrying the fight against the Anglo-American oil agreement both to Congress and the public were mapped at a meeting of the state-wide committee of Texas oil operators here October 20.

Glenn H. McCarthy of Houston, cochairman of the committee, presided at the meeting. Grady Vaughn of Dallas, chairman, was not present.

McCarthy informed the committeemen that headquarters had been opened in Austin, from which a fight against the agreement is planned that will extend into the 23 oil-producing states of the nation.

The cochairman told the committeemen that expressions of opposition to the agreement had been received from Ohio, Mississippi, Oklahoma, Georgia, Alabama, Florida, Kansas, Michigan and New Mexico.

Help Is Pledged

Joe Butler of Corsicana, president of the East Texas Chamber of Commerce, said his organization was willing to cooperate 100 per cent in the fight against the agreement. The same expression came from Al Buchanan of San Antonio, president of the South Texas Chamber of Commerce, while C. V. Lyman of Midland, expressed the opinion the West Texas Chamber of Commerce could be depended upon to join in the opposition.

The Houston chamber already has passed a resolution opposing the proposed treaty.

McCarthy informed the committeemen that plans had been made to prepare a pamphlet for distribution over the state, which will carry a concise argument against the agreement. He also said that each operator in the state would be requested to write or wire his opposition to the agreement to Senator Connally, chairman of the Foreign Relations Committee, which has been given the agreement for consideration, and to other congressmen.

Chairman Jester and Commismisioner Culberson of the Railroad Commission, offered their services to the committee, and the former said he felt sure that the third member, Ernest Thompson, also would be available.

Prospective Colombian Discovery Is Reaming

NEW YORK. — The interesting wildcat test being drilled by Sindicato de Inversiones, S.A., in Colombia, known as 1 Floresanto, which is said to have had an oil showing at a shallow depth, was reaming at 2,218 ft. at last reports. The company is owned 50 per cent by Socony-Vacuum Oil Co., Inc., and 50 per cent by Tropical Oil Co., subsidiary of International Petroleum Co., Ltd.

Socony-Vacuum Oil Co. of Colombia, S.A., reports 5 Cantagallo in the Magdalena Valley district abandoned at 7,059 ft., while 6 Cantagallo was rigging up.

On the Barco oil concession in Colombia, Colombian Petroleum Co., jointly owned by Socony-Vacuum and The Texas Co., was waiting for cement at 9 Socuavo, total depth 5,385 ft. Same operators' 10 Socuavo was testing at 5,384 ft.; 11 Socuavo was waiting to be tested at 5,181 ft.; 12 was drilling at 3,794 ft. and 13 was drilling at 2,254 ft.

In Venezuela, Socony-Vacuum was testing 8 Guario in the San Joaquin area at 10,735 ft., and fishing at 11 Guario at 5,941 ft., while 4 Guico in the Oficina district was rigging up.

In Canada, a deep test being drilled on Prince Edward Island jointly by Socony-Vacuum and Cities Service Co. was drilling at 9,775 ft.

Thirty-Seven Pools Added to Stripper-Well Subsidy List

WASHINGTON. — Thirty-seven pools were added to the stripper well subsidy program, the subsidy amounts were revised for 7, and 11 pools were removed from the eligible list in an amendment to Schedule "A" of Stripper Well Compensatory Adjustments issued late last week by Defense Supplies Corp. All but two of the changes were effective October 1.

The Fitts pool in Pontotoc County, Oklahoma, was included in the program as of September 1, but George H. Hill, Jr., executive vice president and general counsel of DSC called attention to the fact that the Wilcox sand in this pool is not eligible for any price increase.

The OPA will issue orders bringing an additional 19 pools into the subsidy program as of November 1, it was learned here. OPA will also have forms ready for applications, covering high cost wells in about a week, and another OPA amendment, bringing the entire list of subsidy pools up to October 1, will be issued in about 10 days.

Changes listed in the DSC amendment follow:

PART 1—POOLS OR AREAS TO BE ADDED TO SCHEDULE "A"

ARKANSAS

Pool and County—	Increase (cents per bbl.)
El Dorado, East (old), Union	35
Grimes (Woodley), Union	35
Hillsboro (Modisette), Union	20
Stephens, Old (Nacatoch and Buckrange), Columbia, Nevada and Ouachita	35
INDIANA	
Francisco, Gibson	35
Ridge, Posey	35
West Knox, Knox	35
KANSAS	
All pools in Crawford	35
Brown, Cowley	25
Hollow-Nikkel, Harvey	20
Hubbard, Greenwood	35
Inge, Elk and Chautauqua	35
Kruse, Rooks	25
LOUISIANA	
Charenton (0-1,300 ft.), St. Mary	20
MICHIGAN	
Geneva, Van Buren	35
OKLAHOMA	
Billings (shallow), Noble	35
Billings (Siliceous lime), Noble	20
Cement (Fortuna), Caddo	35
Earlsboro, West, Pottawatomie	25
Edgewood, South, Osage	35
Fish (Booch), Seminole	35
Fitts (Cromwell, Gilcrease, Hunton lime and upper Simpson series), Pontotoc (effective Sept. 1, 1944)	20
Henryetta, Northeast, Okmulgee	35
Jackson, Seminole	20
Me-Gra-To-Mole, Osage	35
Paden, Okfuskee	35
Pettiquah, Okfuskee and Lincoln	35
Platter, Osage	35
Reed, Garfield	25
Rosanna, Seminole	20
Sams (Oswego), Noble	35
Sams (Pennsylvanian), Noble	35
Southwest Romulus, Pottawatomie	20
Traugh, Seminole	20
TEXAS	
Powell, Navarro	20
WEST VIRGINIA	
All pools except those producing Pennsylvania Grade crude oil	35
WYOMING	
North La Barge unit area, Sublette	35

PART 2—REVISED MAXIMUM AMOUNTS OF COMPENSATION PROVIDED FOR IN SCHEDULE "A"

ILLINOIS

Dundas Consolidated, Richland and Jasper	25
Elkville, Jackson	35
INDIANA	
Rockport, Spencer	35
LOUISIANA	
Converse, Sabine	35
MICHIGAN	
Pine River, Gratiot	35
OKLAHOMA	
Asher, West, Pottawatomie	25
Penn Creek, Osage	35

PART 3—POOLS OR AREAS TO BE DELETED FROM SCHEDULE "A"

ARKANSAS

El Dorado, East, Union, and Stephens, Columbia, Nevada and Ouachita.

CALIFORNIA

Pyramid Hills, San Joaquin Valley.

LOUISIANA

Bisteneau, Bienville and Bossier; Driscoll, Bienville; Logansport-Joaquin, De Soto; Sibley, Webster, and Simsboro, Lincoln.

TEXAS

Bateman Ranch, King County (effective Sept. 1, 1944); Clara Couch, Crockett, and Scaling, Clay.

OPA will issue orders bringing the following pools into the subsidy program as of November 1:

INDIANA

Pool and county—	Increase (cents per bbl.)
Prairie, Posey	25
KANSAS	
All pools, Elk, east half	35
De Moss, Butler	35
Ponce, Rice	25
Soeken, Rice	35
Kuske, Sedgwick	35
Cross, Sedgwick	20
Pools underlying Secs. 2, 9, 11, 12, Twp. 15s-20e, Douglas	35
NEW MEXICO	
Leo, Eddy	25
OKLAHOMA	
March (Layton-Skinner), Payne	35
Wewoka (Hunton lime), Seminole	35
Price, Pawnee	35
Breene, Osage	35
Tull, Creek	35
Cromwell (Gilcrease), Seminole	25
Long, Hughes	25
Mobbs, Wagoner	35
Piggot, Osage	35
WYOMING	
Pilot Butte (upper light oil), Fremont	35

West Texas Spacing Rules Modified

WASHINGTON. — Spacing regulations have been modified in 45 West Texas counties to permit simultaneous development of shallow and deep zones in these areas, Deputy Petroleum Administrator Ralph K. Davies announced October 24.

This action was taken by issuing Supplementary Order 15 to amended Petroleum Administrative Order 11, which regulates the use of drilling materials in these counties. Supplementary Order 15 is effective immediately.

The new order provides for two separate zones for oil-well development in the 45 West Texas counties. It permits wells to be drilled on 20-acre spacing in the zone above 3,400 ft., and on 40-acre spacing below that depth. Previous to Supplementary Order 15, 40-acre spacing was in effect at all depths.

Under the terms of the new order, each of the two zones may be developed independently of the other. The order leaves to the state regulatory body the requirements as to the distance between wells and the distance of wells from property lines.

The Yates field in Pecos County, Texas, was excepted from the provisions of the order because it had been fully developed before the war and a change in well-spacing requirements is not warranted in that area, Davies said.

The Texas counties affected by the order are: Andrews, Borden, Brewster, Cochran, Coke, Crane, Crockett, Crosby, Culberson, Dawson, Dickens, Ector, El Paso, Gaines, Garza, Glasscock, Hockley, Howard, Hudspeth, Irion, Jeff Davis, Kent, Kimble, Loving, Lubbock, Lynn, Martin, Menard, Midland, Mitchell, Presidio, Regan, Reeves, Schleicher, Scurry, Sterling, Sutton, Terrell, Terry, Tom Green, Upton, Ward, Winkler, Yoakum and Pecos, except

Fuel Oil Orders Revoked

WASHINGTON. — The Petroleum Administration for War's Recommendation 37, which prohibited any commitments for future fuel-oil deliveries, was revoked last week.

At the same time PAW revoked Recommendation 39, which required fuel-oil consumers in Washington and Oregon not to exceed certain maximum temperatures in their establishments.

THIS WEEK

PRODUCTION—Rate of 5,023,900 bbl. daily for all petroleum liquids certified for November. Net rise of 13,100 bbl. but short of all-time peak of 5,051,300 bbl. daily in September. . . . Rocky Mountain quota raised 7,700 bbl. daily to supply newly completed line from Elk Basin to Casper. . . . District 3 increased 4,100 bbl., District 2 upped 1,300 bbl. . . . ¶Natural gasoline and condensate production in November estimated at 303,400 bbl. daily, up 14,300 bbl. . . . ¶Current crude-oil production of 4,740,000 bbl. daily, with estimated 290,000 of lighter petroleum liquids, keeps total supply slightly above requirements. . . .

STOCKS—Inventories of crude oil rise for second consecutive week, arresting downward trend. . . . Above-ground supply remains uncomfortably close to minimum working levels. . . . Rise is particularly noticeable in foreign stocks, a direct result of greater tanker capacity.

PRICES—Subsidy payments extended to 37 additional fields, modified in 7 and removed from 11. . . . ¶Nineteen more pools become eligible for subsidy payments November 1. . . . ¶Application forms will be available in few days for operators in high-cost fields seeking subsidy status. . . .

DRILLING—California's record well drilling ahead below 15,455 ft., 176 ft. below previous champ. . . . ¶Completions rise to 477 for the week, 17,254 for the year to October 21, up 7 and 22 per cent, respectively. . . . Oil wells up 5; gas wells off 2, and dry holes rise 28 for most recent week. . . . ¶Spacing rules modified in 45 West Texas counties. Wells to 3,400 ft. permitted on 20 acres. . . .

INTERNATIONAL—Opposition spreading among independents to British-American oil agreement. . . . Protest meetings held at various Texas and Mid-Continent oil centers, others scheduled in Middle West, Rocky Mountains and California. . . . Revision of agreement, meeting industry objections, may be made before Senate hearings start. . . . Opponents doubt pact can be patched up to their satisfaction. . . . ¶Trans-Arabian pipe lines under active consideration by private companies. . . . Colombian production continues rise, country's newest potential discovery being prepared for testing. . . .

REFINING—Labor disputes growing more numerous in manufacturing end of the industry. Most stoppages of short duration but numerical growth and frequency cause concern, for near-term and long-range view. . . . ¶Base stock for 91-octane and 87-octane aviation gasoline deemphasized by PAW revision in critical petroleum products. Alkylate, hydrocodimer, codimer, isobutane, B-B cut, isopentane, toluene, butadiene, petroleum synthetics, and hydroformate continued in critical list. . . .

POSTWAR—RFC invitation to negotiate for petroleum war plants somewhat misleading. . . . Disposition circumscribed by duration of war and Surplus Property Act. . . . List of plants with invitation to negotiate for acquisition excludes both WEP lines, indicating policy not yet determined on their peacetime operation. . . . ¶WPB expected to delay action on PAW request for postwar-refinery materials. . . .

Typical of reserve supplies required at all Superfort bases in China are these thousands of barrels of 100-plus octane fuel flown over the "hump" by Air Transport Command planes. Tedious and uncertain transportation requires many more thousands of barrels en route, at secondary bases and in process of manufacture

Acme Photo.

Sun Oil Co.'s tank-car repair yard at Twin Oaks. After being unloaded at rack seen at right, cars are given quick repairs without being sent to railroad shops

Prompt Repairs Improve Efficiency of Tank Cars

WASHINGTON. — Sun Oil Co.'s daily average delivery of crude oil per tank car on its run from Meraux, La., to Twin Oaks, Pa. — a round trip of almost 3,000 miles— has risen to 19 bbl., in contrast with 12 bbl. for the same distance in the industry as a whole. Turnaround time between these two terminals has been cut to less than 12 days.

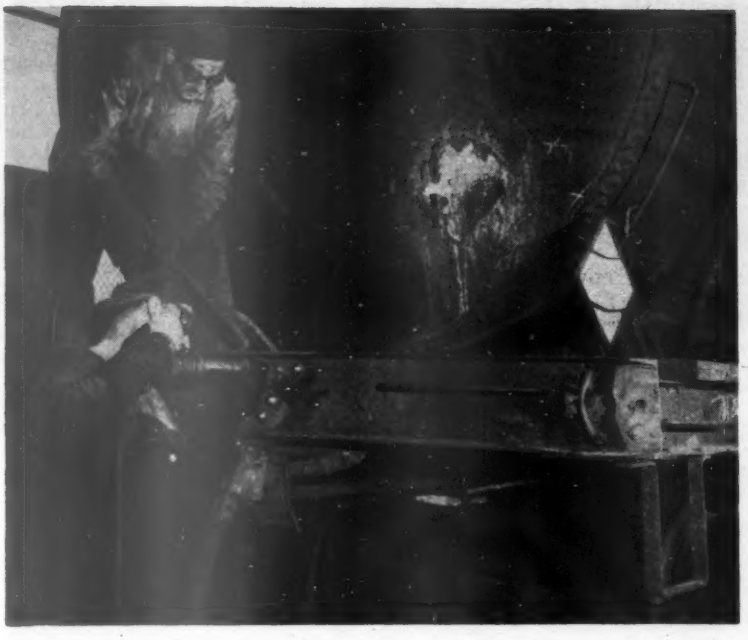
This heightened efficiency in tank-car handling — an improvement of more than 50 per cent—results from installation of facilities to do quick repair work right on the tracks, instead of sending the cars to railroad shops. Exclusive of investment, this work is costing Sun $300,000 a year more than the allowable cost set by Association of American Railroads.

The importance of the Sun's innovation to the wartime oil supply is indicated by the volume of the company's tank-car traffic, which in 1943 amounted to 300,000,000 miles.

Movement of petroleum and its products to the East Coast from fields and refineries of the Southwest presented a difficult problem when war opened. Up to that time the Atlantic seaboard had relied upon oceangoing tankers for 98.5 of its petroleum supplies. In changing to overland transportation it became necessary to handle huge volumes of oil and refined products in tank cars. The first 2 years witnessed revolutionary departure from former practices, so that by June 1943 more than 80,000 of the 107,000 tank cars in petroleum service throughout the country were being used in transportation between the Southwest's oil areas and the East Coast.

Innumerable problems resulted from the evolution. Petroleum Administration for War urged the oil industry to exercise its utmost ingenuity to keep the cars rolling. Disregarding the costs involved, Sun

Left: The bent centersill of a tank car is repaired with a pneumatic hammer, striking with a force of hundreds of foot pounds, at Sun's repair shop at Marcus Hook. Right: Right on the track, this damaged tank car gets a new body bolster cover plate at the Twin Oaks repair yard. Quick repairs have greatly reduced turnaround time



Workmen effect quick repairs on a damaged endsill of a tank car at Twin Oaks

met the challenge by developing its program of tank-car repairs which eliminates the delays incident to sending cars to repair shops, thus greatly reducing turnaround time and increasing deliveries.

This vital behind-the-scenes repair program has been of special importance to the eastern states.

Though construction of the big-inch and little-big-inch pipe lines under direction of PAW has greatly eased the situation on the Atlantic seaboard, substantial tank-car shipments are still necessary. Rail movement of oil products is expected to take on added importance as increased quantities have to be delivered at Pacific Coast ports for enlarged operations against Japan.

Benjamin P. Atkinson, Jr., general foreman of both the on-the-track repair yard at Twin Oaks and of Sun's heavy repair shops at the Marcus Hook, Pa., refinery, said:

"We work night and day, 7 days a week. These cars are taking an awful pounding, but we have to make permanent repairs and get them rolling again, and that applies to a good many cars that would simply be scrapped in time of peace. The most common damage is a cracked or bent centersill, which can be caused by suddenly braking a train, by pushing a heavy string of cars over a grade, or other kinds of rough handling. For leaks in the tank we have curved plates all ready to rivet on.

"Most of our men have been trained right here. They come from all kinds of occupations, and many of them had never done any mechanical work or even physical labor before. But during 1943 we made 37,222 tank-car repairs at Twin Oaks, and 2,000 at Meraux."

November Production Quota Is Increased 13,100 Bbl. Daily

WASHINGTON. — A production rate of 5,023,900 bbl. daily of all petroleum liquids has been certified to the various oil-producing states for November. The rate represents a net increase of 13,100 bbl. daily over that certified for October production, but is short of the all-time high of 5,051,300 bbl. a day certified for September.

The rates of production certified to the eastern and midwestern states (PAW's Districts 1 and 2) remain practically unchanged from those of October to conform with indicated actual production trends.

In the Rocky Mountain states (PAW's District 4) a production rate of 136,800 bbl. a day has been certified, an increase of some 7,700 bbl. daily over October's certification. The increase is sufficient to meet the requirements of the new Stanolind Pipe Line Co. line from the Elk Basin field to Casper, Wyo., which now provides the necessary outlet for available productive capacity in the black-oil fields of northern Wyoming.

For California, the rate certified remains practically unchanged from that of October. Although there has been some increase in productive capacity through completion of new development wells, a small portion of the total rate certified still has to be obtained by exceeding maximum efficient rates in some pools and fields.

Production rates certified for the southwestern states (PAW's District 3) have been increased by 4,100 bbl. daily, with nearly all of this net increase certified for production from Mississippi, where new field discoveries have given an increased productive capacity to the area.

Commenting on the unchanged rate certified for Texas, Ralph K. Davies, deputy petroleum administrator, said:

"Although the quantity of crude oil certified for November production in Texas has not been changed, it will be necessary that some fields continue to produce in excess of their maximum efficient rates. The quantity of sour crude oil certified for production in November has been decreased to give an increased sweet crude-oil rate to supply requirements for refinery runs."

The daily rates of production certified for each state during November are in the accompanying table.

NOVEMBER PRODUCTION RATES
(Barrels per day)

	Certified total petroleum liquids	Estimated nat. gasoline and condensate
District 1:		
New York	13,500	.....
Pennsylvania	42,300	1,300
West Virginia	14,900	6,400
Total	70,700	7,700
District 2:		
Illinois	212,200	12,200
Indiana	13,000	.....
Kansas	280,000	6,000
Kentucky	28,800	2,800
Michigan	51,000	500
Nebraska	1,000	.....
Ohio	9,500	500
Oklahoma	371,900	26,900
Total	967,400	48,900
District 3:		
Arkansas	83,100	5,100
Louisiana	385,000	35,000
Mississippi	50,000	.....
New Mexico	115,500	5,500
Texas	2,278,000	145,000
Total	2,911,600	190,600
District 4:		
Colorado	9,000	.....
Montana	24,400	400
Wyoming	103,400	3,400
Total	136,800	3,800
District 5:		
California	937,400	52,400
Total U. S.	5,023,900	303,400

Texas Allowable Production Exceeds PAW Certification

Agency's Figure of 2,133,000 Bbl. Daily for November Remains Unchanged From Last Month

AUSTIN.—The allowable production authorized for November by Texas Railroad Commission is expected to yield 2,138,385 bbl. of crude oil daily, which is 5,385 bbl. higher than the allowable certified by Petroleum Administration for War. Total production of petroleum liquids for the state, including 146,918 bbl. daily of distillate and natural gasoline, will give a daily flow of 2,285,303 bbl., or 7,303 more than recommended for November by PAW. The November pattern permits 24 general producing days.

The PAW certification for 2,133,000 bbl. daily was unchanged from October, the 22,000-bbl. cut in sour crude being offset by a recommended increase of the same volume in sweet crude from fields tributary to the war emergency pipe line.

Although operators asked an increase in Southwest Texas crude output, there was opposition to increasing the flow from East Texas, principal source of sweet crude tributary to the pipe line.

H. P. Nichols of East Texas Oil Association, asserted that the East Texas field could not continue present withdrawal rates. He took exception to the PAW recommendation for more sweet crude which the PAW recognized was in excess of the maximum efficient rate as determined by the federal agency.

"It occurs to me," Nichols said, "that someone in Washington perhaps is bringing pressure to bear in order to attempt to compel this commission to injure the greatest known field in the world, East Texas."

He added that although purchasers preferred to buy sweet crudes they have been using West Texas sour crudes.

Bottom-hole pressure in the East Texas field dropped 6.27 lb. p.s.i. during September to total 1,001.61 lb. on October 1, the oil and gas division of the commission reported. The field has been drawn upon heavily to supply the big-inch pipe line to the Atlantic Coast. It currently has an average allowable of 378,140 bbl., based upon 24 days' actual production.

In an effort to maintain pressure, 352,923 bbl. of salt water was returned to the Woodbine reservoir, 81.13 per cent of the total water produced. Approximately two-thirds of the total was injected by East Texas Salt Water Disposal Co.

The one request for increased allowables from the Southwest Texas district was in the Keeran field where Gulf Oil Corp. suggested an increase from 58 to 85 bbl. in top per well allowable.

Gulf Coast operators generally testified there was no excess storage of crude in that district and some declared they were short on stocks.

In the West Texas district, decreases were asked as follows: McElroy, 10,000 bbl.; Slaughter, 7,000; Wasson, 6,550; Seminole, 1,000; Yates, 2,929. Two companies asked for a 100-bbl. increase for Keystone-Ellenburger.

Iran Rejects Russian Oil Proposal

MOSCOW. — The Soviet Government's proposal that it be granted a concession for exploitation of oil deposits in northern Iran has been rejected by the Iran Government, and nothing more will be done in connection with the project till after the war.

News of Iran's decision was given in a Tass dispatch from Teheran dated October 10 and marked "delayed in the mails." It quoted Iranian newspapers in criticism of the government's action.

The Tass dispatch did not say what action had been taken on American proposals for southern Iranian oil concessions, which were reported last week. The British Government alone has had Iranian oil concessions. The Soviet offer to undertake the development of Kevir-Khurian oil deposits marked the first time the Moscow Government had shown interest in investing its capital and engineering skill outside its own country.

The dispatch quoted the newspaper Ferman, which described the Soviet offer as of great significance for the development of Iranian economy, particularly in the poorly inhabited northern region. It said Soviet aid would decrease unemployment and help develop a highly qualified body of Iranian workers and engineers. It pointed out the possibility that in the search for oil valuable deposits of iron, copper and coal might be uncovered.

From the profits of this concession and possibly other discoveries, Ferman contended, the Iranian Government could finance necessary Iranian social reforms. This newspaper also commented on the generosity of the Soviet offer and said the terms proposed testified to a Soviet desire to see Iran develop as a strong and independent country.

"Acceptance of the Soviet proposition corresponds with the interests of both countries and will strengthen their economic and political ties," Ferman said.

The newspaper Keikhan attacked the Iranian parliament and deputies who made the decision to delay the granting of further concessions, declaring that these officials had placed their private interests above the interests of their country.

The newspaper Iran Ma was quoted as authority for the statement that Prime Minister Mohammed Saed Maraghei's recommendations to parliament had produced a bad impression abroad and hampered relations with neighboring countries.

Tass said that only the newspaper Forda had agreed with the government's decision to delay concessions until after the war, but added that it saw no objection to the Soviet offer in principle.

Fullerton and Field Companies Merge

Fullerton Oil Co. and O. C. Field Gasoline Corp., have announced a plan by which the properties and businesses of both corporations will be combined under the ownership of Fullerton Oil Co. Under this plan the assets of the Field Corp. will be transferred to the Fullerton company in exchange for 140,740 shares of Fullerton's authorized but unissued stock. The Field corporation will then dissolve and distribute the Fullerton stock, which will then be its only asset, to its shareholders at the rate of 8.79625 shares of Fullerton stock for each share of Field stock. Since 600,000 shares of Fullerton stock are now issued, the present Fullerton stockholders will own 81 per cent, and the present Field stockholders 19 per cent, of the total stock which will be outstanding under the plan.

FOUNDED IN 1910

BY PATRICK C. BOYLE

The OIL AND GAS JOURNAL

The Future Yardstick

AT some point before or after final victory the petroleum industry in this country will be asked by Washington to suggest a program of operations involving the future operating trends of this and other oil-producing countries of the Western Hemisphere. Back of this request will be studies which are seeking a sound basis of allocating the supplies of this hemisphere in the best interests of everyone concerned.

It is true that over a period of years there will be developments in the Eastern Hemisphere which will have a direct bearing on oil activities in this part of the world. A large-scale exploitation of the reserves of the Middle East, for example, would supply those European markets which in prewar days looked to the western fields and refineries for most of their petroleum. There will be other developments emanating from changed conditions in global supplies and demands.

But a more immediate problem has to do with a sound petroleum policy for this continent. At this time its fields are producing approximately 6,100,000 bbl. daily of liquid petroleum, an all-time high. This country accounts for 5,000,000 bbl. daily. Present war projections call for a production outside this country in early 1945 of a minimum of 1,250,000 bbl. daily.

The course of the war and the adjustments after war while the world is returning to a peacetime economy are expected for a time to reduce the total demands to be supplied from this hemisphere. The immediate question is whether the fields of this country or those of neighboring areas should absorb the bulk of the declines.

This problem is being viewed from several angles. Official Washington is emphasizing that the future well-being of all the peoples of this hemisphere is the test to be applied. The furtherance of the good-neighbor policy is involved. What is done will have a bearing on the adequacy of petroleum supplies of this country and its future defenses over a prolonged period.

It is agreed that crude oil produced in excess of the maximum efficient rate should end. There are those, however, who contend that physical waste should not be the sole test to apply in determining production levels. They would make new discoveries in effect the criterion of what national crude-oil output should be. The rapid depletion of large and small fields which is now taking place in certain areas would cease and operators would resume the practice of maintaining reserves which will adequately support their activities 5 to 25 years in the future.

Such a program has many contingencies. It assumes an increase in imports and the giving up of some outside markets formerly supplied from this country. Domestic operators would have to have higher prices for their reduced volume with returns which would support whatever has to be done in exploration to determine the future oil-producing potentialities of this country.

Obviously operators themselves can best determine what should be done. As in other pending matters of policy mere opposition to a suggested procedure by part or all of the petroleum industry will not suffice. A workable plan which takes into consideration the protection of consumers as well as suppliers will prevent the danger of peremptory governmental action later.

Cause of Explosion at Liquefied Gas Plant Still Not Determined

CLEVELAND.—Cause of the explosion and fire here October 20 which destroyed East Ohio Gas Co. liquefied natural-gas storage plant had not been determined early this week. The death toll resulting from the explosion and fire, totaling nearly 200, included many of the company's key operating men who designed and built the plant 4 years ago.

The largest of four liquefied natural-gas containers gave way for reasons not yet known at 2:30 p.m., damaging an adjacent container. Large quantities of the liquefied natural gas were released to the air, where it vaporized and ignited from unknown causes.

The burning gas was carried by the wind, principally eastward, destroying practically every building of the gas company on the premises, and in addition, some 200 dwelling houses and other buildings in the neighborhood. Approximately 70 company employes and 100 residents of the neighborhood lost their lives. The exact loss of life may never be determined because of inability to identify the remains.

The plant site covers an area of 14 acres, upon which the operating plant of the Cleveland distribution system was located. This system consisted of some nine buildings in addition to the liquefaction plant. The plant consisted of compressing and refrigerating equipment and four storage tanks, one cylindrical and three spherical, having a total storage capacity of 240,000,000 cu. ft. of gas.

The cylindrical tank and one of the spherical tanks were destroyed, the other two spherical tanks are still standing after the fire, but whether they still contain any liquefied gas had not yet been determined. An adjacent holding tank, floating on a water seal, and about one-third full of gas at the time of the fire, was apparently undamaged, and it is reported that some of the company employes saved their lives by diving into the water in which the tank was submerged.

The widespread damage was apparently due in part to the fact that the liquefied gas, which was at a temperature of —250° F. within the tank when it was fired, seemingly rolled along the ground in a liquid-vapor form, down the gutters adjoining the curbing, into the catch basins and thus got into the sewers, where an explosive vapor mixture was formed. Intermittent explosions occurred for hours, ripping up pavements and blowing out manhole covers.

The liquefaction plant was the only one of its kind in the world and had been in successful operation for 4 years, with additions made from time to time. No liquefying or vaporizing processes were under way at the time of the explosion, except the natural evaporation which went on continuously in the top of the tanks, despite the thick blanket of insulation. The plant was designed to bleed this evaporation continuously into the low pressure city distribution system. There was also a safety overflow, designed to handle any surplus liquefied gas.

Among company personnel killed in the accident were C. F. Turner, chief chemist; L. Holtz, superintendent of the service and meter department; M. F. Foley, foreman of the machine shop and garage; M. D. Walker, superintendent of the meter-repair shop; H. W. Myers, foreman meter-repair shop and J. H. Locker, chief clerk.

Marshall Elected Head Ashland Oil & Refining

ASHLAND, Ky.—J. Howard Marshall, formerly chief of counsel and assistant deputy administrator, Petroleum Administration for War, has been elected president of the Ashland Oil & Refining Co. He will succeed Paul G. Blazer, who continues as chief executive officer of the corporation with the title of chairman of the board.

J. HOWARD MARSHALL

Marshall graduated from Yale law school and was assistant dean until 1933 when he went to Washington as assistant solicitor in the Department of the Interior and made a member of the Petroleum Administrative Board. He was active in drafting and enforcing the Connally "hot oil" law during NRA.

In 1935, Marshall resigned from public service to become special legal and economic counsel to Standard Oil Co. of California. He remained with that company until 1937 when he resigned to become associate attorney in the law firm of Pullsbury, Madison and Sutro. He became a partner in the firm in 1938. He served PAW from June 1941 until last August when he resigned to return to private industry.

Texas Co. to Hold Election On Bargaining Agency

WASHINGTON. — An election among production and maintenance employes of The Texas Co.'s South Texas division on the question of a collective bargaining agency has been directed by National Labor Relations Board. The vote will be on whether Oil Workers' International Union (C.I.O.) shall represent the workers.

The board said it had found that the appropriate unit for collective bargaining should include all production and maintenance employes of the division's producing department, excluding clerical employes, administrative, technical and professional employes, temporary chairmen and rodmen, foremen, rotary drillers, head roustabouts and all other supervisory employes with authority to effect changes or recommend effective changes in the status of employes.

Prince Edward Island Test Drilling at 10,000 Ft.

NEW YORK.—The wildcat test being drilled off Prince Edward Island, Canada, by Socony-Vacuum Oil Co., Inc., and Cities Service Co. is now drilling at approximately 10,000 ft., it is reported. The test's objective is the Mississippian, expected at about 12,000 ft.

This joint project of Socony-Vacuum and Cities Service is on a drilling island in the open water of Hillsborough Bay, Gulf of St. Lawrence, 8 miles south of Charlottestown capital of the province of Prince Edward Island. Following the acquisition of oil rights on the entire island by Cities Service, Socony-Vacuum in 1942 joined in an exploratory campaign.

Three of the authors who presented papers at the Los Angeles A.I.M.E. meeting were (left) W. P. Cardwell, Jr., of Standard Oil Co. of California; (center) R. L. Parsons, Standard of California, and (right) E. P. Valby, gas engineer, Richfield Oil Corp.

Secondary-Recovery Papers Feature Pacific Coast A.I.M.E. Meeting

by L. P. Stockman

LOS ANGELES.—Eight technical papers concerning secondary recovery, production engineering and petroleum research featured the annual fall meeting here October 20 of the American Institute of Mining and Metallurgical Engineers, Pacific Coast Section, Petroleum Division.

F. S. Carpenter, manager of the United States Rubber Co.'s Los Angeles synthetic plant, was the featured speaker at the stag dinner which attracted capacity attendance. Carpenter discussed development and future prospects of the synthetic-rubber industry, indicating that the petroleum industry has won a permanent position as the supplier of raw materials.

Everett C. Trostel, chairman of the A.I.M.E. Southern California Section, presided at the evening meeting. A. H. Bell, Continental Oil Co., and C. P. Watson, Seaboard Oil Co., presided at the day sessions with M. G. Arthur and J. T. Sinclair, Jr., serving as cochairmen.

Discussion of the paper on an experimental water flood in the Richfield pool, a pilot operation, will undoubtedly stimulate work with secondary recovery in California. This operation is particularly significant because in previous floods engineers have avoided pools where viscosities were as high as 50 centipoises at reservoir temperatures of 140° F. The Richfield pool flooding operation was undertaken because there was nothing else to do to stimulate production from the Chapman zone. Estimates indicated recoveries from the Chapman would be as low as 21 per cent in a zone which on top of the structure averages 300 ft. in thickness. The Richfield pool has produced a total of 103,615,187 bbl. to date but individual well production is approaching economic minimums.

Potentialities of Secondary Recovery

Secondary production methods have received considerable attention during the past few years as engineers realize that if ultimate recovery can be increased even as little as 10 per cent it would mean another 300,000,000 bbl. above present estimates of recoverable oil. Union has indicated that the Chapman sand, with its high viscosity and relatively low gravity oil of 19°, is susceptible of water flooding. It is too early to make the definite assertion that the program, as it stands, is entirely successful as there is some evidence that the water is bypassing or channeling away from the injection well in a direction not yet determined. It is interesting to note that the effect of this waterflooding program is being reflected in a well farther down structure and has not yet affected a structurally higher well. Only about one-tenth of the sand thickness is being flooded. Union may undertake flooding at Richfield on a larger scale if the present pilot operation proves successful. The injection well which was drilled for that specific purpose was cored entirely through the Chapman zone with 90 per cent core recovery.

E. P. Valby, gas engineer for Richfield Oil Corp., presented a method in which the hydrocarbon-weight fractional analysis of the well effluents from a true gas-cap well and a true dark-oil-ring well furnish the basic data for determining the properties of any mixture of production from the two sources. The effect of injected gas on these properties can be computed. Comparison of similar properties of a given well effluent to the properties of mixtures of the basic well effluents will give the relative amounts of production from the two sources and injected gas. This method has been developed to enable petroleum engineers to follow the movement of injected gas in pressure-maintenance, or cycling operations. Periodic surveys made by this method will indicate the trend of the operations and materially assist in controlling the dilution of wet gases being processed by absorption plants. Pressure maintenance and cycling operations will become of more importance in the near future with the start of operations at Coles Levee and other similar fields. The methods outlined by the author should be especially applicable at Paloma where all the conditions mentioned exist, even to the belt of black oil.

The wisdom of using air to determine sand permeability measurements was questioned in another discussion. Argument showed that after the cleaning process, a considerably different permeability is determined with salt or fresh water than is obtained with air. The postulate was made that the salt-water permeability is probably closer to the actual reservoir permeability than is the measurement with air.

Use of the centrifuge to measure capillary pressures was advocated in one paper because this method allows the curves from small consolidated core samples to be quickly and conveniently determined and to be extended to large values of capillary pressure. Use of this method allows the employment of oil as well as water or other liquid. One of the main reasons why progress in the application of capillary phenomena to the solution of problems of reservoir mechanics has not been more rapid, it was reported, has been the

lack of a satisfactory technique for measuring the capillary pressures in reservoir rocks.

A paper on average permeabilities of heterogeneous oil sands resulted in considerable discussion. The paper outlined the practical problem of estimating a single equivalent permeability for an oil reservoir or a portion thereof, whose actual permeability varies in an irregular manner. Limiting averages for general types of permeability variation were developed and illustrated by examples involving important specific types of variation.

Abstracts of A.I.M.E. Technical Papers

Average Permeabilities of Heterogeneous Oil Sands

W. T. CARDWELL, JR., and R. L. PARSONS, Standard Oil Co. of California, La Habra.

THIS paper discusses the practical problem of estimating a single equivalent permeability for an oil reservoir, or a portion thereof, whose actual permeability varies in an irregular manner. Limiting averages for general types of permeability variation are developed and illustrated by examples involving specific types of variation.

It is believed that the particular problem of the estimation of equivalent permeabilities can be most directly approached from a fluid dynamical viewpoint. No simple mathematical considerations can indicate whether the equivalent permeability of a complex formation lies nearer the upper arithmetic average limit or the lower harmonious average limit. However, in the application of these results to oil-producing sands there is a good reason to favor the upper limit.

The equivalent permeability of a heterogeneous oil sand lies between a harmonic volume average and an arithmetic volume average of the actual permeabilities. The volume elements in averages are weighted according to the inverse squares of their distances from the well. When the permeability variations away from a well are unknown, it is reasonable to assume that the equivalent permeability of a heterogeneous oil sand lies between the harmonic depth average and the arithmetic depth average of the core sample permeabilities.

Water Permeability of Reservoir Sands

NORRIS JOHNSTON and CARROL M. BEESON, General Petroleum Corp., Los Angeles.

THE authors condemn the use of air to measure the permeability of reservoir sands through a cleaned and dried core sample. The result differs from the true reesrvoir permeability in this important respect: the rock particles in the reservoir are surrounded by interstitial water, not air, and their physical shape and condition of hydration are greatly dependent thereon. Permeability as defined must be measured with a single-phase fluid. Since no means exist fos removing the oil and gas from a core sample by simply flowing water through it, the sample must be cleaned and then resaturated with water before testing. The present discussion presents results to show that after the cleaning process, a considerably different permeability is determined with salt or fresh water than is obtained with air. The postulate is made that the salt water permeability is probably closer to the true reservoir permeability than is the measurements with air. This is discussed in relation to both physically possible and economically feasible measurements. Data on over 1,200 core samples are given to show the nature of the effects observed and a plea is made for others to consider water permeability measurements as a routine necessity, eventually replacing air permeability in regions where the differences are great.

Synthetic Liquid Fuels and New Sources for Petroleum

H. C. MILLER, Principal Petroleum Engineer, Bureau of Mines, Petroleum and Natural Gas Division, San Francisco, Calif.

THE author, after calling attention to the absence of synthetic liquid-fuel industry in the United States, indicates that Germany in 1939 was probably producing about 25,000,000 bbl. of gasoline a year from coal. These synthetic plants were probably producing about 50,000,000 bbl. annually before the Allies gained control of the air. Since 1935 England, too, has been producing gasoline from coal and probably Japan is also making liquid fuels synthetically. Attention is directed to the early work of the Bureau of Mines on synthetic fuels and investigation in 1935-36 on direct hydrogenation of coal to produce fuels. This experiment which has continued up to the present has shown relative yields ranging from 63 gal. of gasoline for each ton of lignite to 110 gal. per ton of subbituminous coal and 135 gal. a ton for the best high-volatile bituminous coal.

Under a bill passed by Congress April 5, 1944, the Bureau of Mines is authorized to undertake research and laboratory studies and construct and operate demonstration plants for the direct hydrogenation of coal or lignite by some modification of the Bergius process, the indirect hydrogenation of coal or lignite by the gas synthesis process, and the distillation

(Continued on page 65)

Colombia's Oil Production Maintains Steady Rate

NEW YORK.—Production of crude oil in Colombia has been maintained at a steady rate after substantial increases earlier in the year, recent statistics indicate. Output in recent months was as follows, according to statistics of the Minister of Mines and Petroleum.

	Crude oil (bbl.)	Nat. gasoline refined products (bbl.)
August 1944	1,962,893	29,430
July 1944	2,052,475	25,308
June 1944	1,916,800	27,621
May 1944	2,050,693	33,906

Output for the 4 months ended August 31, 1944, consisted of 982,861 bbl. of crude oil and 116,265 bbls. of natural gasoline, etc., a total of 8,099,126 bbl. This is a daily average of 65,846 bbl.

Butane Banned for Use at Drilling Wells in Gas Areas

WASHINGTON.—Petroleum Administration for War has issued Directive 79, prohibiting the use of butane as a fuel in oil-well drilling operations wherever natural gas is available for the same purpose.

The directive is effective November 1 and will continue through the winter in order to conserve butane for aviation gasoline, synthetic rubber and domestic fuel. Deputy Administrator Davies advised all drillers to prepare to use natural gas unless it is impossible to obtain it.

DEATHS

John J. Larkin, 63, president and founder of the Larkin Packer Co., died at St. Louis October 23. He organized Larkin Packer Co. at Bartlesville, Okla., in 1905, and moved the plant and headquarters to St. Louis in 1920. Before coming to the Mid-Continent area he had been associated with his father in petroleum equipment manufacturing at Butler, Pa. Two sons, W. H. and J. J., Jr., both vice presidents of the firm, are among the survivors. He also leaves three brothers, Frank of Tulsa, C. L. of Bartlesville and W. H., Jr., of Butler.

William E. Walters, supervisor of the oil-movement and storage department of Standard Oil Co. of New Jersey at its Bayway, N. J., refinery, died October 15 at his home in Linden, N. J. He had been with Standard Oil since 1907.

Kelly R. Johnston, 65, for the past 10 years sales representative for Calumet Refining Co. in Wisconsin and northern Illinois, died October 13 in Chicago.

W. J. Miller, 71, retired oil-well drilling contractor, died October 21 in Tulsa.

Walter Arns, 57, chief engineer, Gardner-Denver Co., died last week at Quincy, Ill., headquarters of his company. He spent 4 years in the Mid-Continent area as district manager for Worthington Pump & Machinery Corp., and as a member of the firm of Arns and Woolbank. He was employed by the Rix Co. in Los Angeles, Calif., from 1921 until he joined Gardner-Denver.

John George Goll, whose life was associated constantly with the oil industry for 68 of his 78 years, died at his home in Saginaw, Mich., after a prolonged illness. He helped bring into being the oil industry in Michigan as contractor for Saginaw Prospecting Co. in drilling the first commercial well in Michigan in August 1925, in Saginaw. He was president of the firm of Goll, Graves & Mechling, which began as a partnership in 1929. He took an active part in oil conservation measures.

Rio Grande Floodway Water Successfully Conditioned for Use in Drilling Rigs

By E. H. Short, Jr.

Six steam-operated drilling rigs are being supplied with water from Pan American Production Co.'s recently completed plant for treating Rio Grande River water. The daily average quantity of water treated is about 400,000 gal. at present, with 630,000 gal. the expected goal. The plant was designed by E. V. Hewitt, general production manager of Pan American.

AT the edge of the Rio Grande Valley in Willacy County, Texas, Pan American Production Co. has utilized floodway water for the steam rigs drilling on its properties in the Willamar pool.

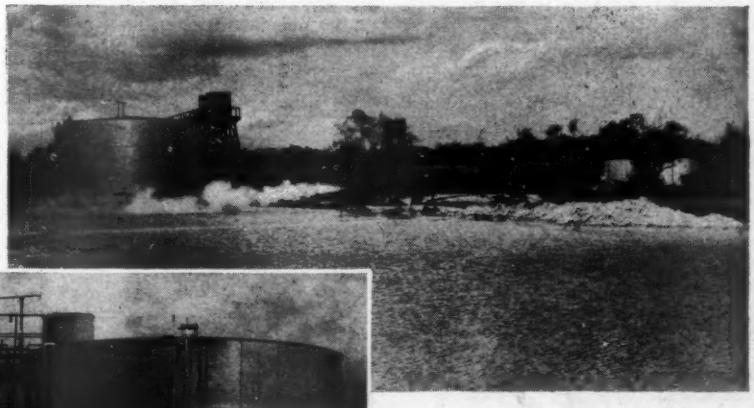
To appreciate the engineering problem involved in such a conditioning project, it is necessary to have a conception of the hardness and origin of floodway water. Seepage from subsurface formations is responsible for some of the hardness. Also the Rio Grande River water has a natural hardness. The waste irrigation water which runs off from orchards and various crops makes up most of the volume carried in the floodway. The average hardness of the water is approximately 30 grains per gallon, although at times it may run as high as 60 grains. After a heavy rainfall, the hardness may drop as low as 10 grains. An analysis of the untreated floodway water shows total solids of 215 grains per gallon, as follows:

Sodium sulfate	85
Sodium chloride	100
Magnesium sulfate	12
Calcium bicarbonate	8
Calcium sulfate	10

The pump station supplying water to the treating plant is located on the floodway approximately 4 miles from the Pan American campsite.

Pan American's recently completed plant for treating Rio Grande water is adjacent to the company campsite, which is approximately 22 miles east of Raymondville, Tex. The entire layout, with the exception of the mixing tank, which is located behind the structure to the right, is shown in Fig. 1. The two large tanks each have a capacity of 5,000 bbl. The two small tanks, which appear in the background above the large tanks are for chemical storage, each having a capacity of 60 bbl. The two installations in front of the 5,000-bbl. tanks are heating units which were being installed at the time the picture was taken.

The 5,000-bbl. tanks are equipped so that water can be agitated or rolled in order to obtain a perfect mixture of the chemicals and raw water. This is accomplished by admitting gas at 50-lb. pressure through four 1-in. by 6-in. nipples spaced at equal distances around the bottoms of each tank. The ends of the nozzles, or nipples, are toward the centers of the tanks. The manifold system at the tanks is such that water from the floodway may be diverted into either tank. In normal treating operations, water enters one tank



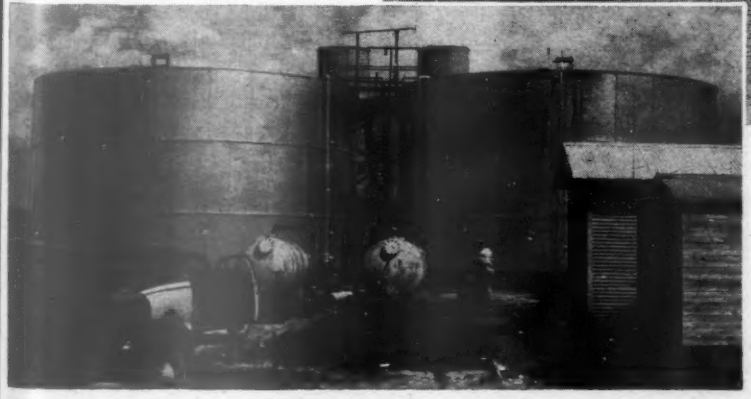


Fig. 1 (left): Pan American Production Co.'s water-treating plant in the Willamar pool. Fig. 2: (above): Earthen storage tank for treated water. Steam-operated pumps in background furnish water to drilling rigs

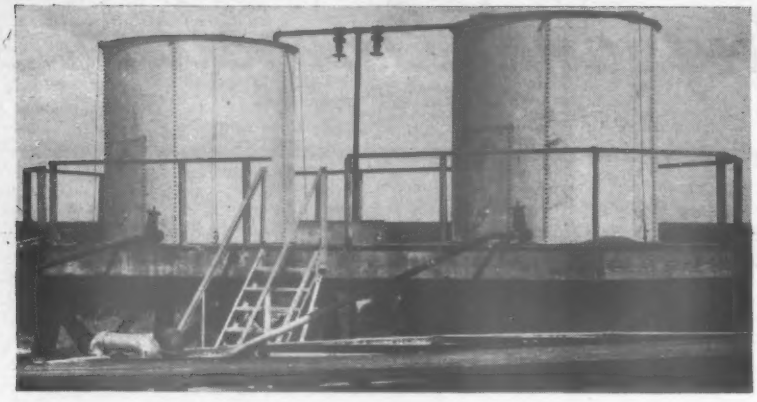


Fig. 3: Chemical storage tanks on stands which place them 2 ft. above tops of the 5,000-bbl. tanks

while the other tank is permitted to settle out and then to drain out into the earthen storage tank shown in Fig. 2.

Operation of the System

Perhaps one of the most important features incorporated into the design of this plant is one which permits constant engineering supervision of the treatment. Many elaborately designed oil-field water-conditioning plants have failed to consistently produce good boiler water because their operation was turned over to nontechnical operators. In many cases the operators received instructions from engineers only at infrequent intervals. Pan American, however, has a full-time treating engineer in charge of the plant operation. The means of effecting "constant" engineering supervision, even though the engineer is not on duty during the full 24 hours of a day, is through the chemical storage facilities provided in the plant design.

Two chemical storage tanks are provided above the two 5,000-bbl. tanks, explained Harry Douthit, treating engineer in charge, "so that I can get some sleep." Ordinarily it is possible to anticipate the proper treatment several hours ahead, so that by having ample chemical storage capacity, Douthit can calculate and mix the chemicals for the plant operator to use during his absence. No approximate mixes are tolerated, and all chemicals specified by Douthit are weighed in by means of the scales.

Operation of Plant

After periodic laboratory analyses of raw water entering the plant, the treating engineer calculates the most economical and effective combination of chemicals to be used in treating the water. The chemicals are mixed in the 100-bbl. tank (Fig. 4) and pumped to the chemical storage tank above the treating tanks, by means of a ¼-hp. centrifugal pump located beside the tank. The chemicals are admitted in proper proportions into a 5,000-bbl. tank at the time it starts to fill. At present about 8 hours are required to fill a 5,000-bbl. tank, after which it is rolled or agitated for a period of 30 minutes. Following this operation, the tank is allowed to settle out for 2½ hours. Approximately 3 hours are required for the tank to drain out into the earthen reservoir pit shown in Fig. 2. It takes about 45 minutes to empty the accumulated sediment from the treating tank to a pit located a short distance from the reservoir pit.

Treating Chemicals

During a normal treating operation, the chemical mix used is a 5 per cent solution. Caustic soda is used to neutralize temporary hardness and soda ash for neutralizing permanent hardness in the raw water. Nalco aluminate is used as a coagulant. In addition to the treatment of the water at the plant, sodium phosphate is used at the drilling rigs. This internal treatment guarantees zero hardness of the water. Approximately 30 lb. of sodium phosphate is used per rig per 24 hours. Type and amount of chemicals required at the plant for the treatment of 1,000 gal. of average raw water are: 2.4 lb. caustic soda, 1.6 lb. soda ash, and 0.33 lb. sodium aluminate.

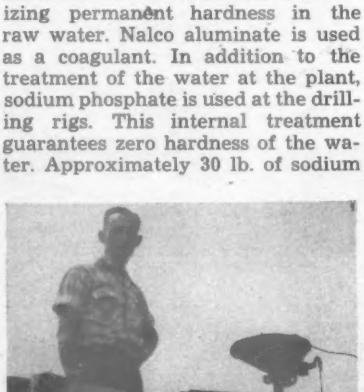


Fig. 4: Harry Douthit, Pan American treating engineer, atop the 100-bbl. chemical mixing tank

Treating Innovations

In addition to the advantages already mentioned in having a full-time engineer in charge of large treating plants (especially in cases where the proper treatment of water is by no means of routine nature), the day-by-day contact an engineer has with the treating problem often enables him to formulate methods for improving the efficiency of the operation.

During the process of treating water it has been consistently observed that sediments in the bottoms of the tanks have a definite value in softening the water each time they are agitated. Douthit believes that this softening value comes from the slight solubility of the precipitated hydroxides, whose action tends to raise the pH value of the raw water sufficiently to liberate some carbon dioxide. This, in turn, probably throws down the calcium bicarbonates as calcium carbonate. This action is reflected in a comparison of the amounts of chemical theoretically needed to soften the raw water as compared with the amount actually used. The caustic apparently saved by this action amounts to approximately 0.54 lb. per 1,000 gal. of water treated. The saving in soda ash in treating the same quantity of water amounts to 1.23 lb. It has been noted that about 20,000 gal. of sediment in the 5,000-bbl. tank gives the maximum softening capacity to be obtained from sediments.

The water which enters the reservoir pit has a hardness of less than 1 grain per gallon. The total soda alkalinity, which is the sum of the excess of caustic and soda ash in treated water, is less than 10 grains per gallon.

Use of Heat in Treating Water

While the plant is operating at a high degree of efficiency, turning out excellent boiler water, Pan American plans to experiment on the use of heat in treating the water. Two heaters are now being installed to determine the effect of heating the water as a means of neutralizing some of the bicarbonate hardness, and in accelerating chemical reaction. This is simply a test, since the two heaters now being installed are not expected to have the capacity necessary for all of the water handled through the plant. During the experimental work the water will be heated to approximately 120° F. The heaters are shown in the foreground of Fig. 1.

A.I.M.E. ABSTRACTS

of papers presented before the annual fall meeting of the Pacific Coast Section, Petroleum Division, at Los Angeles, October 20

(Continued from page 60)

of oil shale. This process, which was developed in Germany, comprised in essence forcing hydrogen into the complex coal molecules and removing oxygen, whereupon the coal liquefies. To do this, a small quantity of catalytic material, such as a compound of tin, is mixed with a paste of finely powdered coal and heavy oil. The mixture is pumped into a high-pressure steel vessel or converter with hydrogen gas at a pressure of 3,000 to 8,000 lb. per sq. in. and subjected to a temperature of 800°-900° F.

Light, middle and heavy oil fractions are recovered, the heavy oil fraction is returned to the beginning of the process to be mixed with coal. Because pilot plants do not permit development of catalysts, larger pilot plants will be built to test the process on different types of coal and lignite and this work will lend directly to the design, construction and operation of demonstration plants to obtain reliable engineering and cost data.

A Method for Determining Fluid Movement in Wells

SHERMAN L. PEASE, Production Department, Shell Oil Co., Inc., Bakersfield, Calif.

THIS paper deals with a method developed by Shell's production department based upon releasing a suitable tracer in the well fluid at a known level, and recovering a sample of well fluid at another level after a measured interval of time. Repetion of this process with different time intervals between release and sampling gives the necessary data. The elements of the combination unit are the tailpiece, the crushing device, the spacer, and the sampling device. The crushing device breaks the bottle containing dye mechanically. The rate of migration can be calculated from the relationship of the time interval to the volume represented in the interval between the releasing and sampling points. Solutions of brilliant water-soluble aniline dyes have been found suitable in wells having high water cuts and the dyes can be identified in fluids having a water cut as low as 10 per cent. Contrasting dyes are used to identify each run if necessary. The general method has many possible variations with respect to equipment, technique and tracing materials, depending upon the objectives in mind and, with minor changes, the equipment can be used to determine downward movement as well as upward movement of fluid in a well bore.

Measurement of Capillary Pressures in Small Core Samples

G. L. HASSLER and E. BRUNNER, Shell Development Co., Emeryville, Calif.

THIS paper describes a method by which the relation between capillary pressure and saturation can be determined for small consolidated core samples which have been extracted and resaturated. The authors believe the centrifuge method of measuring capillary pressures suffers from some disadvantages of which the greatest are its limitation to a single branch of the hysteresis loop and the fact the data must be smoothed out before the capillary pressures are calculated so that an estimate of the precision of a measurement is difficult. On the other hand, this method allows the capillary pressure curves of small consolidated core samples quickly and conveniently to be determined and to be extended to rather large values of capillary pressure. This method is not limited to use with a liquid and a gas as the fluids in the core. By filling the core holder and pipette initially with oil and saturating the core with water, the capillary behavior of the core to oil and water may be measured directly.

The use of a capillary diaphragm for measuring capillary pressures is very satisfactory in the region of low capillary pressure and correspondingly high saturation but is severely limited by the low displacement pressures of reasonably permeable diaphragms. The gravity-drainage method of measuring capillary pressure is ruled out by the authors because very long columns would be required and a single measurement would be a major undertaking. The difficulties with the method of gravity drainage for measuring capillary pressure arise from the small value of the acceleration of gravity at the earth's surface. Accelerations several thousand times greater than the earth's are easily obtained by means of the centrifuge. The use of a centrifuge introduces a new possibility, that is the varying of acceleration to which the core is subjected. The average saturation of the core can be determined at the different accelerations by collecting and measuring the liquid that leaves the core and in this way it is possible to determine the relation between capillary pressure and saturation for the core.

An Experimental Water Flood In a California Oil Field

E. C. BABSON, J. E. SHERBORNE, Union Oil Co., Los Angeles, and P. H. JONES, Union Oil Co., Wilmington.

THIS paper presents the results of a water-flooding project involving the upper or Chapman zone in the Richfield oil field of California by Union Oil Co. in which an injection well was drilled down structure and treated water injected under varying pressures. It has been demonstrated that water can be injected into the Chapman zone on a sustained basis and that this injected water will displace appreciable quantities of oil from the sand.

The Chapman zone is found at depths from 3,000 ft. to 3,700 ft. and has an average porosity of 31 per cent and an average permeability to air of approximately 1,100 millidarcys. Viscosity is approximately 50 centipoises and the oil ranges from 16° to 22° gravity. Production to date has approximated 19 per cent of the oil in place and estimates of the ultimate under present production methods ranged from 20 to 22 per cent.

The injection well was drilled entirely through the Chapman zone and 5½-in. casing cemented through perforations at the base of the underlying Kraemer shale. Pumping equipment was installed and the injection well pumped over a period of 3 weeks at the rate of 4 bbl. daily after which the rods and tubing were pulled and preparations made to start injection of water. The injection water is waste water produced from the Chapman and Kraemer zones in other wells. A water-treating plant was constructed to handle a maximum of 1,000 bbl. per day and by taking advantage of topography the treated water is gravitated from the treating pond to a raw storage basin from which it is pumped by a centrifugal pump into the primary flocculator. The water before being injected is subjected to treatment with alum and chlorine. Provision has been made to add other chemicals to neutralize the chlorine and improve flocculation whenever deemed necessary. Water injection was started March 29, 1944, and injection pressures were consistently increased during April, May, and June to maintain injection. In August, injection pressure was stepped up to 729 lb. and put away 3,840 bbl. of water. In September, injection pressure was increased to 812 lb. and injection of water totaled 3,909 bbl. Production of the nearest well increased from 7 bbl. in March to 26 bbl. daily in September and water production during the same period in the same well increased from 1 bbl. to 450 bbl. per day, tangibly indicating the effect of water injection.

Volumetric and Phase Behavior of Oil and Gas From Paloma Field

R. H. OLDS, B. H. SAGE and W. N. LACEY, California Institute of Technology, Pasadena, Calif.

LIQUID and gas samples were obtained from the primary separator of a well in the Paloma field, California. The volumetric properties of the samples and of six systematically chosen mixtures of the samples were experimentally determined at 100°, 190° and 250° F. at pressures up to 5,000 p.s.i. From these data the influence of pressure and temperature upon the composition and specific volume of the bubble-point liquid and of the retrograde dew-point gas was established. The formation volumes and gas-oil ratios of the mixtures investigated were calculated on the basis of the plant-product oil, which is defined as the isobutane and less volatile portion of each mixture. The results are presented in graphical and tabular form.

The volumetric behavior of the mixture corresponding to that produced by the well at the time of sampling was determined at 235° F., the reported reservoir temperature, by graphical interpolation of the experimental data with respect to composition and temperature. The results indicate that the well-production mixture most probably existed as a gas at its retrograde dew point under the conditions of temperature and pressure believed to prevail in the producing zone at the time of sampling. The effect upon the phase behavior occasioned by the omission from the well-production mixture of certain components of intermediate molecular weight was investigated. In the first case all of the isobutane and n-butane, and substantially all of the isopentane were removed from the mixture of trap samples corresponding to the well production. In the second case all the propane, isobutane and n-butane, and substantially all of the isopentane were removed. Both modifications resulted in considerable increases in the retrograde dew-point pressure at 235° F.; an increase of 558 p.s.i. above that of the unmodified well-production mixture in the first case, and an increase of 1,208 p.s.i. in the second case. It was concluded that the materials remaining after the removal of certain components of intermediate molecular weight could not be injected back into the reservoir in the same proportion in which they were produced without entailing appreciable loss of liquid through condensation within the formation.

Underground Reinforced Concrete Tank For Aviation-Gasoline Storage

by George P. Collier *

Growing scarcity of steel plate has led to the development of reinforced-concrete designs for underground gasoline storage tanks. Such a tank has been constructed by the Army, which has no special lining on the interior, as here described.

1. **Contemporary design.**—The use of steel plate for gasoline storage tanks has been the only type of construction considered suitable until recently, when the growing scarcity of steel plate led to the development of reinforced-concrete designs. Various governmental agencies have constructed a number of concrete tanks, both above and below ground, for this type of service. The general design has consisted of prestressed concrete hoop-steel and tank linings such as sprayed enamel or synthetic rubber sheets cemented to the inside of the tank. The difficulty of obtaining trained personnel to install tank linings and the high cost of the linings led the Army to construct a conventional type of reinforced-concrete tank with no special lining on the interior.

*Engineer, War Department, United States Engineer Office, Mobile, Ala.

2. **Design.**—The tank has a capacity of 55,000 gal. and was built so as to be completely submerged in groundwater, as shown in Fig. 3. The tank is 30 ft. in diameter, 10 ft. 6 in high, inside dimensions, with a 14-in. floor slab, 12-in. walls, and a 10-in. flat roof slab supported by four 18-in. square columns, as shown in Fig. 2. The roof of the tank has a 4-ft. earth cover which is utilized both as a protection against bombing and as a means of holding the tank in the ground when empty. The pumps were installed, as shown in Fig. 1. The 50-gal. g.p.m. sump pump was installed primarily to care for any water leakage which might occur. The gasoline is picked up by the 200-g.p.m. pump, deep-well-turbine type, with an inverted suction bell at the bottom of the pump column to avoid any inclusion of water. The tank was vented at atmospheric pressure as 100-octane aviation gasoline has a Reid vapor pressure of 7 p.s.i. which does not necessitate conservation vents on underground tanks.

A site having high ground water was selected with the thought that any gasoline seepage which would be set up due to the porosity of the concrete would be counteracted by the ground-water pressure which would tend to force the water through the walls of the tank and form a water film upon the interior. Such water film would also materially aid in cutting down any chemical reaction between the free alkali on the concrete surface and the aromatic admixtures present in the gasoline. Groundwater also serves as an effective prestressing agent on the concrete wall, eliminating the use of prestressed hoop steel.

3. **Excavation and shoring.**—The excavation was made through a light layer of vegetable matter, possibly 6 in. deep, after which beach sand was encountered to the bottom of the hole. The groundwater elevation at the start of operations was approximately 30 in. below grade, but this level was subsequently lowered by pumps to around 6 or 8 ft. before any shoring was attempted. (See Fig. 4.) At this point Wakefield piling was driven to approximately 19 ft. below grade, the piling forming a nine-sided figure with three main walers cross-braced as shown. This cross-bracing was left in position until the bottom slab

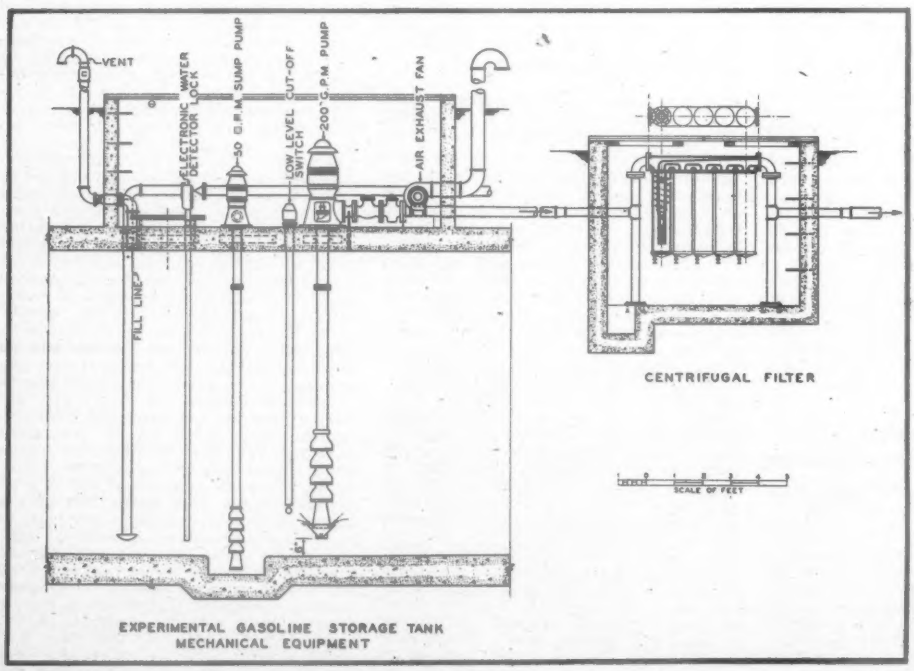


Fig. 1

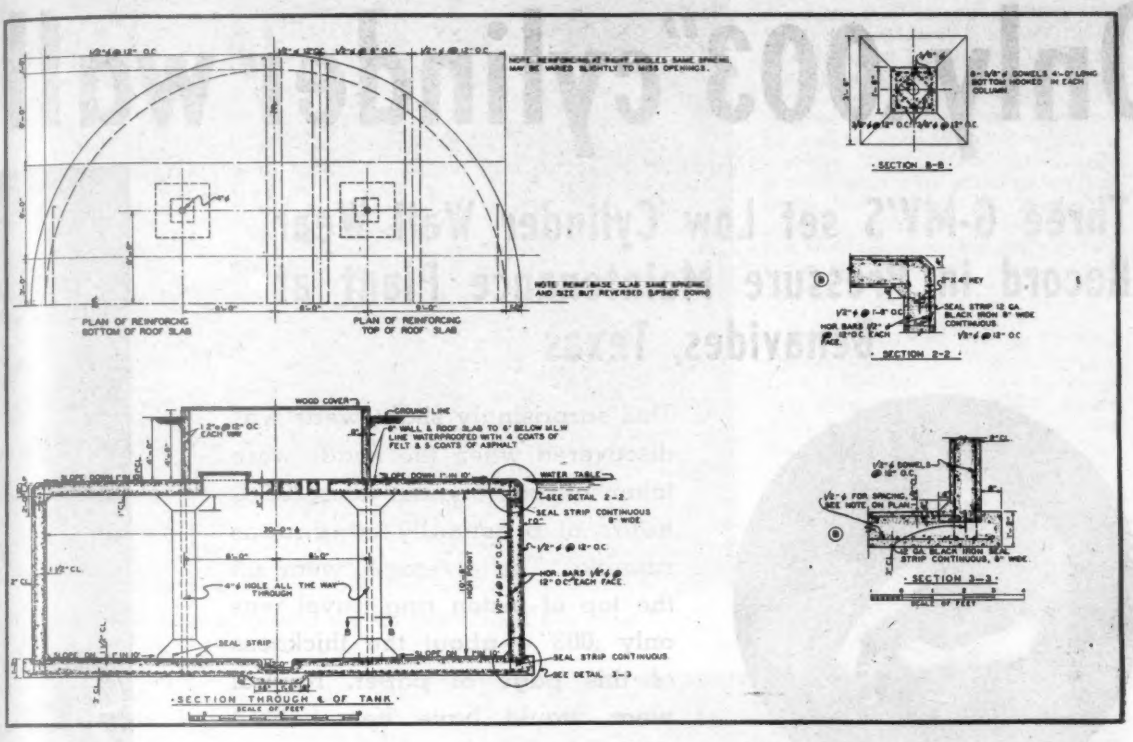


Fig. 2

had been poured, after which a trench was dug around the outside of the piling and the interior bracing removed to allow room for placing the forms. The excavation was kept dry with a 4-in. self-priming centrifugal pump which was operated practically continuously.

4. **Mixing and pouring concrete.**— The first design called for a rather porous concrete, but it was decided before final construction that too much faith should not be placed in the water-seal theory, and the final concrete-mix design gave an impervious concrete. The mix consisted of one part cement, two parts sand, and three and one-half parts coarse aggregate, with maximum size coarse aggregate limited to 1 in. The screen specification of the coarse aggregate was as follows:

	(Per cent by weight) Passing
Maximum size mesh screen (square mesh)	97-100
One-half maximum size mesh screen (square mesh)	40- 70
No. 4 sieve	0- 6

The fine aggregate was well graded from coarse to fine sand with sieve analysis as follows:

Sieve description	Square mesh sieves AASHO-27
No. 4	95-100
No. 16	45- 85
No. 50	10- 30
No. 100	1- 10

Water cement ratio was kept at 6 gal. of water per sack of cement and the slump ran from 2 to 3 in. A 28-day test showed a strength of 3,800-4,000 lb. The floor slab was placed using conventional methods and was well vibrated, after which forming for the walls was placed and the walls were poured with no construction or expansion joints with the exception of the key joints at the floor and roof-slab levels where metal water stops were installed. One unusual feature of form construction was the absence of ties between the interior and exterior wall forms. The exterior forms were supported by ½-in. steel bands which were wrapped around the studs and tightened by turnbuckles, and the interior form was braced from a central timber like the spokes of a wheel.

In pouring the walls elephant-trunk shutes were placed approximately 5 ft. apart, and every effort was made to keep the concrete from flowing horizontally so as to avoid segregation. The primary function of the elephant-trunk chutes was to prevent the concrete from striking the reinforcing steel or form work as the first condition tends to segregate materials and the second has a tendency to leave small particles of cement and sand sticking to the forms with ultimate damage to the surface. The first 6 in. of wall above the floor slab was placed with one-half of the coarse aggregate omitted to avoid stone pockets at the joint which would have tended to accelerate water seepage The remainder of concrete was placed in approximately 12-in. layers and the rate of pouring was kept slow, the tank wall progressing about 2 ft. per hour, to eliminate as much bleeding of the concrete as possible. This bleeding has a tendency to force the water to the top of the pour and tends to form alternate layers of coarse and fine texture concrete. A gasoline-powered flexible-shaft vibrator was used to consolidate the layers, the vibrator slowly traveling down through the layer being placed until it penetrated the previous layer after which it was slowly withdrawn. The travel of the vibrator was kept as nearly vertical as possible and no attempt was made to use it for distributing the concrete. The face of the forms was well spaded during the pouring operation in order to work out any stone pockets and to insure that no air bubbles had formed. After the final wall pour had been made, the concrete was allowed to stand overnight, after which the top of the wall was flooded with about 3 in. of water. This water level was kept more or less constant for a period of around 7 days after which the wall forms were stripped. No attempt was made to dress any part of the interior surface by hand rubbing and no patching was found necessary. However, if patching were required for similar tanks, it is recommended that the patching mix consist of one part sand and one part cement mixed fairly dry

Only .003" cylinder wall

Three G-MV'S set Low Cylinder Wall Wear Record in Pressure Maintenance Plant at Benavides, Texas

ONE one-thousandth inch of cylinder wall wear in 1000 hours' operation is the normal expectation of engine operators.

In the Continental Oil Company plant at Benavides, Texas, three Cooper-Bessemer G-MV gas-driven compressors are operating with .001" wear per 9,500 hours' operation, one-tenth of normal expectancy.

This surprisingly slight wear was discovered when the heads were taken off one engine, after 28,200 hours of practically continuous running. The average wear at the top of piston ring travel was only .003" — about the thickness of this page of paper. Normal wear would have been about .028".

This record is typical of the performance of hundreds of heavy-duty G-MV's on tough jobs in all parts of the country. It is the result, not of one factor, but of the engineering skill and careful manufacturing that are embodied in every part of the G-MV.

Throughout the G-MV, men who know engineering will find point after point in which skillful designing and extra care have built an engine that will stand up for years with a minimum of time-out or maintenance expense.

TYPE G-MV ANGLE Compressors

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.

Fig. 3: Showing completed structure preparatory to back filling

and allowed to set ½ hour before placing and then reworked and the wall thoroughly dampened before applying this mix. The purpose of the ½ hour setting period is to allow the patching mixture to obtain its essential shrinkage as most patches slough off due to the shrinkage taking place after the patch has been placed. The columns and roof were poured using conventional methods, and the tank was allowed to cure for 28 days before being placed into service.

5. **Final inspection and test.**—One main objection to the use of concrete for gasoline storage has been the possibility of the chemical reaction of the free alkali always present on concrete surfaces and the aromatic admixtures present in high-octane gasoline. In order to keep close check on this reaction 10,000 gal. of 100-octane gasoline were placed in the tank and allowed to remain without disturbance for approximately 3 months. During this period a gallon sample of this gasoline and 4 ounces of water were taken from the tank at weekly intervals and tested in a laboratory. No harmful reaction was detected and the tank has been in regular service for about 1 year. Inspection of the interior made at the end of the 3-month period showed no appreciable change or even discoloration on the wall, and no appreciable penetration of water was found. It was noted, however, that one or two small hair-line cracks had evidently allowed a slight amount of water to enter, and a considerable deposit of calcium carbonate was found at these spots. In view of this fact, it is highly probable that if the tank had been constructed of porous concrete, as first contemplated, the interior would have been practically a solid mass of calcium carbonate with possibly some injurious alkalies present. It is strongly recommended that all tanks be constructed as nearly impervious to water as possible. This type of construction is considered well suited to wartime needs for underground storage of gasoline, particularly where there is a shortage of skilled labor to fabricate steel tanks.

Willis C. George, a driller for Shell Oil Co., Inc., in the Ventura Avenue field, California, has been promoted to drilling foreman. **Lewis F. Busey,** head well puller for Shell in the San Joaquin Valley, has been advanced to assistant production foreman, with offices at Bakersfield.

Charles E. Davis, of the executive staff of Arabian American Oil Co., is now in San Francisco with his family spending a portion of his leave from duties in the Middle East.

Fig. 4: Showing installation of Wakefield piling

Fig. 5: Base slab has been poured and contractor is preparing to set forming for walls

NEW EQUIPMENT

Developments by Manufacturers Designed to Facilitate Operations of Petroleum Industry

Elliott Mechanical Drive Turbine

DESIGNED for driving pumps, fans and other machinery operating at less than normal speeds, the Elliott Co.'s (Jeanette, Pa.) single-stage Type CY steam turbine, in combination with a built-in, geared, speed-reduction unit provides a compact assembly for low-speed service.

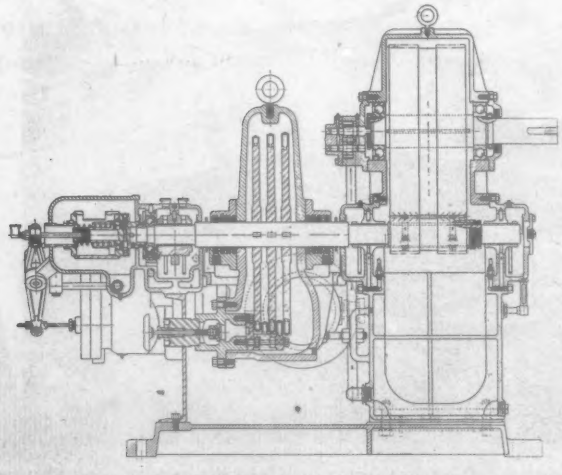
Construction of the unit allows omission of the exhaust-end bearing, bearing pedestal and high-speed coupling which, with a vertically offset gear in the speed reducer, permits a straight throughshaft from the turbine, both length and width of the assembly, thereby being considerably less than that of the average coupled turbine-gear-reducer setup.

Housing of the herringbone type helical gears in a casing which is horizontally split on the same plane as that of the turbine enables ready inspection and repair of both turbine and gear. A cast iron bed plate under the turbine and gear assure permanent alignment of the unit.

Special alloy steel is used for the high-speed pinion which is mounted on the single shaft with the turbine wheel; the gear rim is forged steel.

The output shaft runs in single-row, ball-type antifriction bearings sized to handle the maximum radial loading. Sleeve type bearings are used at the gear end of the turbine shaft with an antifriction-bearing unit at the turbine end of the shaft.

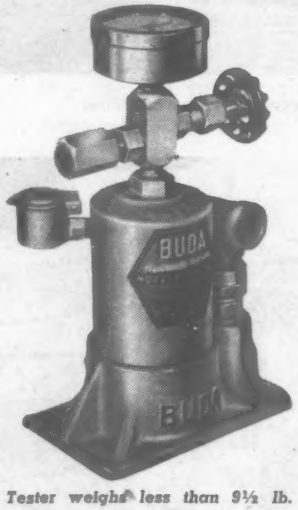
Forced feed lubrication is carried to all parts of the unit by means of a positive displacement self-priming gear type oil pump.



The Elliott mechanical drive turbine

Buda Nozzle Tester Featured by Simpliciity

A DEVICE, for testing all makes of diesel fuel injection nozzles, fuel injection pumps, hydraulic controls and the like, has recently been announced by the Buda Co. Simplicity, portability and versatility of use are included as outstanding features of the tester.



Tester weighs less than 9½ lb.

Weighing less than 19½ lb. complete, including a 6⅝-in. by 7⅛-in. by 11½-in. steel-carrying case, the tester stands 10½ in. high over-all with a base or mounting flange 6 in. by 3½ in. Because of its weight and size the unit conveniently may be used for on-the-job testing.

Equipped with either a 3,000 or 5,000 p.s.i. gage the tester is adaptable to measuring injector-opening pressures, in checking spray patterns for distortion and to detect irregularities such as sticking needle valves and leakage around valve seats. Sufficient capacity in the self-contained testing-oil reservoir permits ordinary routine testing of 20 to 25 nozzles. When desired the tester may be connected to a tank for a continuous supply of testing oil.

Standard equipment includes one adapter. However, the manufacturer has available adapters to fit practically every injector in use today.

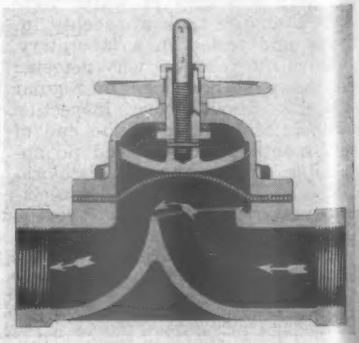
McAlear Mfg. Co.'s Diaphragm Valve

REQUIRING no packing and having no metal-to-metal contact for shutoff, the newest diaphragm valves developed by the McAlear Manufacturing Co. are said to be leakproof when placed in any position. The valves, available in 10 sizes from ½-in. to 6-in., screwed or flanged ends, are arranged for either hand operation or for remote operation by air or water pressure.

Body linings of rubber, glass or of lead permit the valves to be used in the many different services of corrosion and of abrasion where temperatures do not exceed 150° F. and the pressures are not over 150 p.s.i. The diaphragm construction permits positive shutoff in installations handling pumpable solids.

Adaptation of the diaphragm arrangement to such items as check valves and pilot operation has been carried out by the manufacturer.

This line of valves is distributed by Hanlon-Waters, Inc., 11 North Cincinnati Street, Tulsa.



Valves are available in 10 sizes

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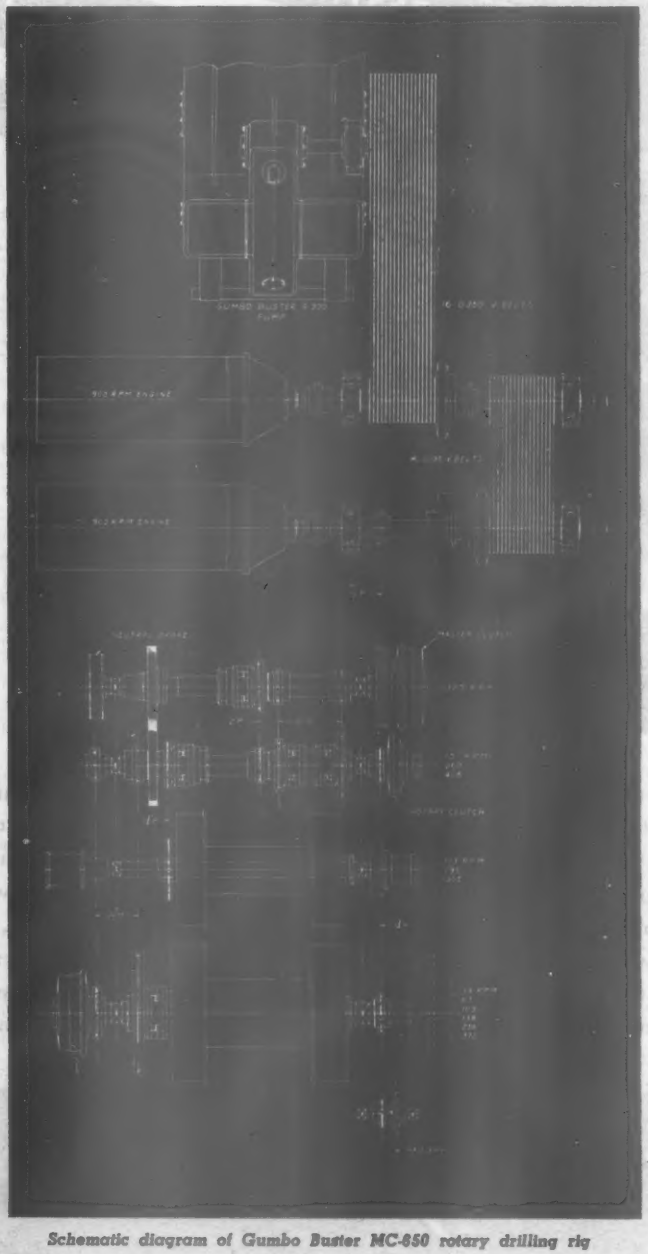
Bethlehem Gumbo Buster MC-650 Rig



Schematic diagram of Gumbo Buster MC-650 rotary drilling rig

Mechanical Specifications

Capacity: 11,000 ft., with 4½-in. drill pipe.
Prime movers: Two 350-hp. engines.
Transmission:
Capacity.—Rated at 700 hp.
Drives.—Chain with manually operated jaw clutches for speed shifts.
Speeds.—Three forward and one reverse provided within transmission unit.
Drive.—Two chain drives from transmission to draw works drum giving six forward speeds on drum, three forward speeds to rotary and one reverse speed to drum and rotary.
Chains.—Engine to jack shaft 1½-in. triple strand, transmission drive 2-in. double; drum-shaft drives (high and low) 2½-in. pitch double.
Shafts.—Jack shaft, 7½-in. diameter. Line shaft, 7½-in. diameter.
Housing.—Transmission shafts are mounted on heavy "I" beam frame and fully enclosed in an oiltight steel case.
Clutches.—Jaw type. All transmission clutches operated with the same lever so arranged that it is impossible to engage more than one clutch at a time.
Drum and drum shaft: 26-in. o.d. barrel; 9¼-in. diameter drum shaft.
Drum clutches: Bethlehem Gumbo Buster air clutch on high speed. Jaw clutch on low speed.
Master clutch: Bethlehem Gumbo Buster air clutch on jack shaft.
Compounding: V-belts or chain. 6½-in. diameter shafts.
Pump drives: V-belts.
Bearings: Timken, Rollaway, Hyatt.
Brake flanges: 52-in. diameter, 12½-in. face.
Hydromatic brake: Single or dual rotor.

Salient Features

THE master and high-speed drum clutches are of the disk type and are direct air actuated by integral direct-acting pistons. No cams, roller, or toggles are used and no adjustment is necessary to compensate for lining wear. Clutch facings are of the metallic type, insuring a constant and predetermined coefficient of friction at all temperatures. Air for the clutches is provided by a compressor driven from the engine rotating element shaft.

Centralized Convenient Controls

Controls governing the speed of the engines, the air-actuated master clutch, the neutral brake, the transmission-speed changes, and the draw works and rotary have been reduced in number and are positioned so that the driller can operate any of them while facing the rotary table. Speed of the engines is controlled through a compound throttle control by a handwheel attached to a lever that operates the air valve for the master clutch and neutral brake. The engine speed is controlled by revolving the handwheel to the right or left and the air valve on the master clutch is actuated by pulling the wheel forward, or pushing it backward. All transmission speed changes are controlled by a single lever. The high and low-speed drum-control clutches are foot operated and so positioned that the driller can conveniently operate them by foot while controlling engine speed and master clutch with left hand and brake lever with right hand.

Selective Transmission

The jack and line shafts in the transmission operate on heavy-duty self-aligning roller bearings. The bearings are retained in steel boxes that are securely welded to heavy steel "I" beams to assure rigidity and permanent alignment. The three cam-operated, heat-treated,

Front view of draw works

step-cut, forward-drive jaw clutches and the sliding reverse gear are all controlled by the same lever and so arranged that it is impossible to engage more than one clutch at a time. When not in use the reverse gears are disengaged, thus eliminating wear at this point.

Filtered Oil Spray Lubrication

Positive lubrication is assured by a rotary oil pump driven from the jackshaft. The oil is pumped into a reservoir from which it flows to all points through individual spray lines. The oil drains to a sump through a filter screen and is recirculated. All chains, including the transmission input and output chains, are enclosed in oiltight, dustproof enclosures. Alemite lubrication is provided where such a lubricant is required and connections are centralized for convenience.

Road-Width Construction

The draw works is built in two parts—a drumshaft unit and transmission unit. These parts are bolted and doweled together when the rig is in use and separated into easily handled units for moving. The skids are extended to accommodate a single or double hydromatic brake on the rotary side.

Extra Wrap Brakes

The heat-treated, hardened and ground, steel brake flanges are 12½ in. wide by 52 in. in diameter and are cooled by a new method employing a combination of air and water. The air, which is furnished by a blower driven off one of the

MODERN DRILLING

rotating element shafts, is piped under pressure over the moist inside surface of the brake flanges. The brakes are the triple-compound design, which gives tremendous leverage with positive, smooth action regardless of the load to be controlled. The brake bands contact the brake flanges through a 330° arc giving 3,742 sq. in. of effective brake surface. All shafts and pins used in the brake system operate on roller bearings and are Alemite lubricated.

Side view showing compactness of totally enclosed combination draw works and transmission unit and engine drive

ABOVE AND BELOW: Two views of 36" x 16' x 500 lb. H-W Type H-2 High Pressure Oil and Gas Separator Metering Installation.

AT RIGHT: Type 855 Liquid Level Controller consisting of 8" x 900 lb. Type 844 Torsion Tube Float Flange with Type 1411 Pilot. 2" x 600 lb. Flanged Globe C.F.B.O. Type 86-D Motor Valve. 2" Type 222-HD Drip; Type 303 Auxiliary Equipment Panel and Accessories.

NEW torque tube Level Controller Now Standard Equipment on ALL H-W high pressure Oil and Gas Separators

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by *Improved Separator Control Assembly*

Adaptation of the famous Hanlon-Waters Type 855 Liquid Level Torsion Tube Assembly to all H-W High Pressure Separators is a great forward step in efficient, trouble-free separation of oil and gas under high working pressures.

No Leakage—No Friction. H-W Displacement Type Level Controllers utilize Torsion Tube Assemblies to transmit float movements. Torsion Tube may be replaced without removing flange from separator. Stuffing box and pressure type bearings are eliminated.

Hence there can be no leakage under high pressure to "freeze" stem and float action. No "hydrate" trouble. Production is *uninterrupted.* Downtime and maintenance costs are reduced.

H-W Type 1411 Pilot, *furnished with these Controllers,* can be set for "snap action" or—for smooth "throttling" oil valve action—WITHOUT special tools or parts.

Because displacement principle is employed and floats are constructed for high pressure operation—there can be NO collapsing floats.

Thus low cost, *efficient* separation of oil and gas is obtained by the now standard combination of H-W Type 855 Liquid Level Controllers with Hanlon-Waters Separators. For full facts on these vastly superior separator units, write for bulletin.

API—ASME Code Construction. All H-W Separators for 250 to 3000 lb. pressures are API—ASME Code Construction. H-W Separators for 125 lb. working pressure are available in both Standard and API—ASME Code Construction.

IF YOU HAVE A SEPARATOR OR CONTROL PROBLEM call on H-W engineers. Draw on their wide experience, on their readiness and willingness to help you. For informative bulletins or catalog, write Hanlon-Waters, 11 N. Cincinnati Street, Tulsa, Okla. *Affiliated with Climax Engineering Co., Clinton, Ia. McAlear Manufacturing Co., Chicago.*

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The Commercial Isomerization of Lighter Paraffins

by B. L. Evering, N. Fragen and G. S. Weems

Five commercial plants are described in which normal butane, normal pentane and normal and slightly branched hexanes are converted to isocompounds for aviation - gasoline manufacture. Feed stock mixed with anhydrous HCl is passed upward in small liquid drops through a liquid aluminum chloride - hydrocarbon complex catalyst. Fairly pure neohexane can be made by fractionation and recycling the remaining hexanes. Hexanes and pentanes may be isomerized together. Very high liquid yields are obtained.

STANDARD OIL CO (INDIANA) and subsidiaries are putting five new plants into operation at their refineries for the production of isobutane and aviation-gasoline components by the isomerization of light paraffinic hydrocarbons. These plants, listed in an accompanying tabulation, employ three separate new processes for the isomerization of light naphtha, pentane and butane, all of which are integrated with the current 100-octane-number aviation gasoline production at these refineries.

While new aviation - gasoline plants are starting up nearly every day, the number of processes involved are relatively few. Therefore, it is felt that the novel character of the isomerization processes employed in the above plants warrants such description as secrecy orders, censorship, and regulations will permit.

The development of new catalytic isomerization techniques has not only made possible a simple continuous butane isomerization process but, with the development of suitable inhibitors, has also furnished a simple pentane isomerization process and made possible the commercial production of neohexane and high-octane-number aviation blending stocks. The latter process greatly extends the potential source of aviation blending stocks in that light fractions of crude of low-octane number, which cannot be readily processed to aviation-gasoline quality by other methods, are converted in high yield to high-octane-number aviation-gasoline components. The processes also have potentialities for producing aviation gasoline of higher quality than is now being made.

Company—	Refinery location	Type	Reactor charge bbl./day
Standard Oil Co. (Indiana)	Whiting	Isomate	5,000
Standard Oil Co. (Indiana)	Whiting	Isobutane	4,530
Utah Oil Refining Co.	Salt Lake City	Neohexane	1,750
Standard Oil Co. (Indiana)	Wood River	Isobutane	4,250
Pan American Refining Corp.	Texas City	Isopentane	1,620

General Description of Isomerization Processes

The effect of the structural arrangement of pentanes and hexanes on boiling point, Reid vapor pressure and octane number is shown in Table 1. From this table it is clear that the commercial importance of isomerization results from converting the straight or slightly branched hydrocarbons of poor octane number which predominate in crude to more highly branched isomers of high-octane number.

In these processes, a paraffinic feed is contacted in a simple reactor with a liquid aluminum chloride-hydrogen complex catalyst in the presence of hydrogen chloride to yield a product rich in branched-chain aliphatic hydrocarbons. The catalyst is a dark mobile liquid with a specific gravity of about 1.5 and a viscosity slightly higher than S.A.E. 50 lubricating oil. The reactor feed enters the bottom of the reactor as a liquid and undergoes isomerization as it passes upward in contact with the liquid catalyst. In spite of the fact that $AlCl_3$ is appreciably soluble in hydrocarbons this catalyst complex is substantially insoluble in hydrocarbons and may be readily separated therefrom by settling. Furthermore, the particular catalyst complex used has remarkable capacity for retaining $AlCl_3$ added as makeup due to the high $AlCl_3$ distribution coefficient between the complex and hydrocarbon at reactor conditions. This fact has made possible the important improvement of operating in the liquid phase and on a continuous basis without excessive loss of catalyst.

Side reactions that decrease the yield of desirable products and increase catalyst requirements are

THE AUTHORS

EVERING

FRAGEN

WEEMS

B.L. Evering was graduated with an A. B. degree from Loyola College at Baltimore in 1930, and upon receiving his Ph.D. degree from Johns Hopkins in 1934 went directly to Standard Oil Co. (Indiana) as a research chemist in the research department. In 1943 he became a group leader, which position he now holds in exploratory research.

N. Fragen received his B.S. in chemical engineering from University of Washington in 1929 and served as assistant physical chemist with the U. S. Bureau of Mines until 1932. After completing his study for a Ph.D. at University of Michigan he joined Standard of Indiana as a chemical engineer in the research department. In 1938 he became a group leader and in 1943 was appointed a section leader, which position he now holds in charge of pilot-plant development.

G. S. Weems was graduated with a B.S. degree from Mississippi State College in 1937 and M.S. from Massachusetts Institute of Technology in the following year. He went directly to Standard of Indiana as a chemical engineer in the research department and assumed his present position as an assistant general foreman in the manufacturing department in 1944.

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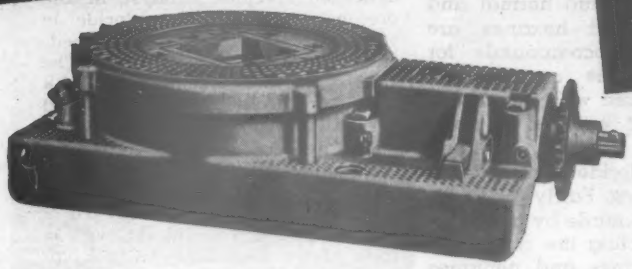

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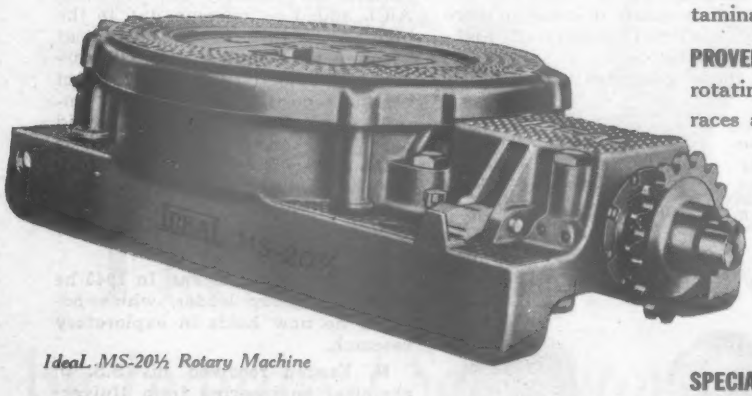

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IMPROVED PINION SHAFT ASSEMBLY—Pinion shaft is mounted on a pair of roller bearings supported in individual housings secured to the under side of the base. The entire unit may be easily removed and all elements on the pinion shaft are removable over the sprocket end.

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IdeaL SHS-20½ Rotary Machine

minimized by the use of suitable inhibitors. The necessity of using such inhibitors depends on the type of charging stock employed and, in some cases, combinations of inhibitors give better results than any single inhibitor.

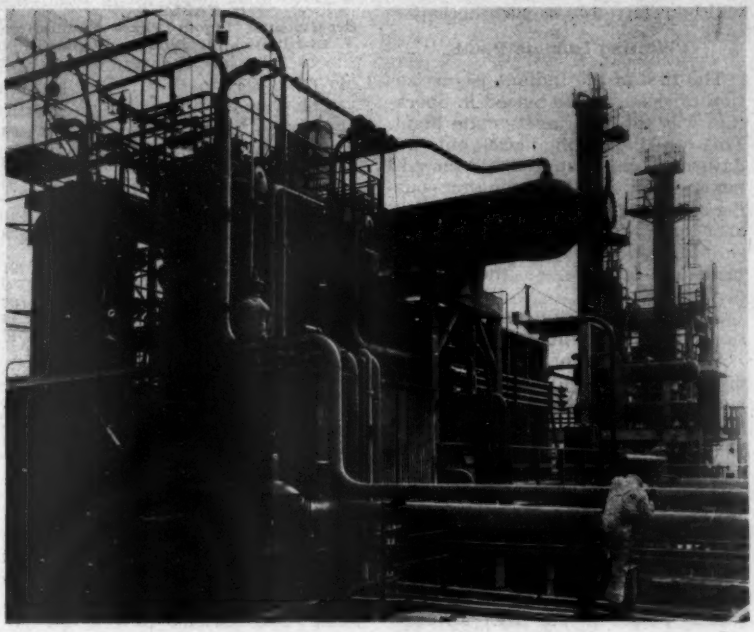
Determined by Conditions

The character of the isomerization product is also determined to a considerable extent by the operating conditions and is limited by the chemical equilibrium. Table 2 presents the liquid-phase equilibria for butanes, pentanes, and hexanes at various temperatures, as determined by laboratory experiments. Although there is substantial agreement in most instances with the theoretical values of Rossini, Prosen, and Pitzer (J. Research Natl. Bur. Standards, 27, 529, 1941) the experimental value for neohexane is somewhat lower and that for isobutane somewhat higher than the calculated. The only notable discrepancy is the complete absence of neopentane although thermodynamically it is the favored isomer at low temperature.

On the basis of these developments and the use of conventional fractionation systems and recycle, a complete system of isomerization for C_4, C_5 and C_6 paraffin hydrocarbons has been worked out. These isomerization processes may be classified as follows:

1. Naphtha isomerization (pentanes and hexanes)
   (a) Isomate (once-through)
   (b) Neohexane (recycle)
2. Pentane isomerization
3. Butane isomerization

These processes, their variations and applications are described in more detail in the following paragraphs.



A close-up view of the Whiting isomate unit reactor section

TABLE 1—PHYSICAL PROPERTIES OF PENTANES AND HEXANES

			Octane number	
Pentanes:	B.P., °F.	R.v.p. lb./sq.in.	A.S.T.M. (clear)	AFD 1—C+ 4.0 cc. TEL
Isopentane	82	21.0	90	100 + 1.9
n-Pentane	97	15.5	62	87
Hexanes:				
Neohexane	122	9.4	94	100 + 5.6
2,3-Dimethylbutane	136	7.1	94	100 + 3.6
2-Methylpentane	141	6.5	74	96
3-Methylpentane	146	5.8	74	96
n-Hexane	156	5.0	26	69

Whiting isomate unit viewed from isopentane tower

Naphtha Isomerization

The Indiana naphtha isomerization process is particularly suited for the isomerization of hexanes; however, it is usually more desirable to process a light naphtha containing both pentanes and hexanes. The process may be employed on a once-through basis in which event the product constitutes a high-quality aviation base stock containing the hydrocarbon components nearly in their equilibrium proportions. Alternately, it may be operated on a recycle basis in which case the higher-boiling, low-octane-number isomers may be selectively removed from the product by fractionation and recycled to the reactor for further conversion. By this latter operation a product consisting predominantly of isopentane and neohexane may be produced. There are various other combinations such as recycle of n-pentane and once-through on hexanes or once-through on pentanes and recycle of hexanes which serve to illustrate the extreme flexibility of the processes. The reactor effluent from naphtha isomerization has been termed "isomate" and

will be referred to as such hereafter.

Whiting Isomate Plant

The first of the Indiana isomerization processes to be placed in operation was the Whiting isomate plant. This unit, charging 5,000 bbl. per day of light naphtha, isomerizes hexanes and pentanes simultaneously, operating once-through on hexanes and recycling on pentane. A simplified flow diagram showing the principal features of the unit is given in Fig. 1.

A dry, light virgin naphtha fraction of approximately 160° F. A.S.T.M. end point, anhydrous hydrogen chloride and aluminum chloride are charged to the reactor system and spent catalyst is withdrawn.

The effluent from the reactor system is cooled in an aftercooler and enters a cold settler or receiver. This settler operates as a vapor release drum as well as a settler for any catalyst carried with the reactor effluent. The product from the cold settler passes to the HCl stripper, where HCl is taken overhead along with a small amount of light hydrocarbon gases. The overhead gases from the HCl stripper and make-up HCl are returned to the reactor system. A remarkably small amount of dry gas is formed in the isomerization process so that HCl losses due to venting are very low. The bottoms from the HCl stripper are caustic and water washed to prevent traces of HCl from entering the fractionation system.

TABLE 2
Experimental Liquid Phase Equilibrium Distribution of Butanes, Pentanes and Hexanes

	Liquid volume per cent			
Temperature, °F.	70	212	300	400
Butanes:				
Isobutane	85	75	65	57
n-Butane	15	25	35	43
Pentanes:				
Isopentane	95	85	78	71
n-Pentane	5	15	22	29
Hexanes:				
Neohexane	57	38	28	21
2,3-Dimethylbutane	11	10	9	9
2-Methylpentane	20	28	34	36
3-Methylpentane	8	13	15	17
n-Hexane	4	11	14	17

The fractionation system is of the conventional type. The HCl free isomerized product is debutanized and the butanes, consisting of 75 per cent isobutane, are taken overhead. The bottoms flow to the depentanizer tower where pentanes are taken overhead and highly isomerized hexanes are withdrawn as bottoms. The pentane overhead, consisting of 75 per cent isopentane, is further fractionated in the isopentane tower to produce isopentane of 95 per cent purity and a recycle n-pentane stream for further conversion to isopentane. The isopentane and isomerized hexanes form a balanced high-octane-number light base stock which materially increases the production of 100-octane-number aviation gasoline.

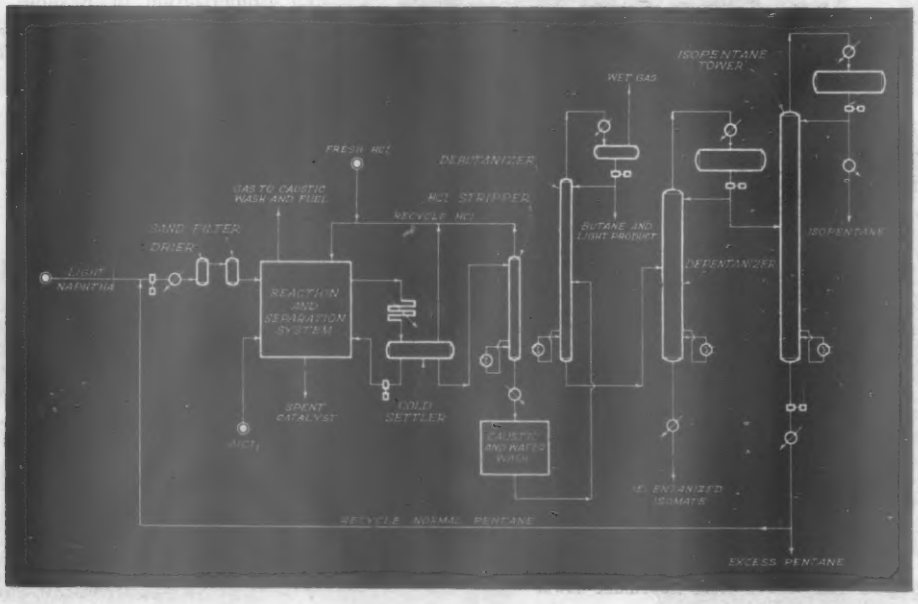
As shown in Table 3, the yield of debutanized isomate is extremely high, exceeding 95 per cent by volume. The gaseous products are mainly isobutane which is a valuable by-product. When butanes produced are included with the liquid isomate the yield exceeds 100 per cent by volume.

As pointed out before, the quality of the isomate is determined to a considerable extent by the reaction conditions and is limited by the chemical equilibrium of the reaction. Operating conditions are chosen such that a close approach to equilibrium is obtained. Although, from an equilibrium standpoint, lower temperature favors the production of branched chain hydrocarbons, lower temperature also decreases the reaction rate and the degree of approach to equilibrium. Therefore the reaction temperature is selected by balancing reaction rate, equilibrium, catalyst life and the increased tendency toward hydrocarbon decomposition by cracking at higher temperatures. Table 3 shows the yields and product quality of the reactor effluent under typical operating conditions on a once-through basis when charging a Mid-Continent hexane feed. The over-all effect is primarily one of converting n-hexane (26 A.S.T.M. octane number) to neohexane and diisopropyl. The distribution in the reactor effluent is essentially independent of the composition of C_6 paraffins in the reactor charge.

TABLE 3—YIELDS AND PRODUCT QUALITY FOR ONCE-THROUGH AND RECYCLE HEXANE ISOMERIZATION

	Hexane feed	Once-through	Recycle ratio 1:1	Recycle ratio 2.1 (calculated)
Yields:				
Dry gas, volume per cent	...	1.8	3.6	5.3
Butanes, volume per cent	...	3.8	6.3	8.7
Product, volume per cent	...	96.8	87.2	85.2
Bottoms, volume per cent	...	...	7.0	6.2
Product octane number:				
A.S.T.M. (clear)	65.0	80.0	88.0	91.4
AFD 1—C+ 4.0 cc. TEL	87.0	100	100 + 1.5	100 + 3.6

Fig. 1: Flow diagram of the Whiting isomate unit



The isoparaffins produced in the process not only have high octane numbers but excellent lead susceptibilities as shown in Table 3.

The Salt Lake City unit of Utah Oil Refining Co. charges 1,750 bbl. per day of light naphtha. This unit, an example of the Indiana neohexane process, recycles hexanes to produce a neohexane concentrate and operates once-through on pentane.

The reactor system is substantially the same as that described for the

isomate process. From the debutanizer, the bottoms pass to the hexane tower. Pentanes (75 per cent isopentane) and a neohexane concentrate are taken overhead while hexane recycle is removed as a bottom stream. The hexane recycle is first passed through a rerun tower to separate out about 10 per cent heavy ends before returning to the reactor.

The chemical requirements for the neohexane process are only slightly higher per barrel of product than for the isomate process in spite of the recycle. This is due to the small HCl and catalyst requirements for conversion of the recycle which has been "cleaned" by previous contact with the catalyst.

Cyclopentane Desirable Component

The quality of the neohexane concentrate is affected by the degree of fractionation and extent to which the hexanes are recycled. In Table 3 are shown the yield and product quality of neohexane concentrates for 1:1 and 2:1 recycle ratios compared to once-through operation when charging a virgin hexane fraction. Neohexane from virgin naphtha will always contain small amounts of cyclopentane as it is impractical to separate these hydrocarbons due to the closeness of their boiling points. Cyclopentane is in itself a desirable aviation-gasoline component. It is also desirable to include any diisopropyl (2,3-dimethylbutane) in the neohexane concentrate since this is another desirable component of aviation gasoline. For this particular Mid-Continent virgin hexane feed the effect of 1:1 recycle ratio is essentially to convert n-hexane and part of the 3-methylpentane to neohexane. Increasing the recycle ratio to 2:1 results in conversion of 2-methylpentane to neohexane product. Both 2-methylpentane and 3-methylpentane are of marginal quality for aviation gasoline and therefore the desirability of their conversion will depend on the local refinery situation.

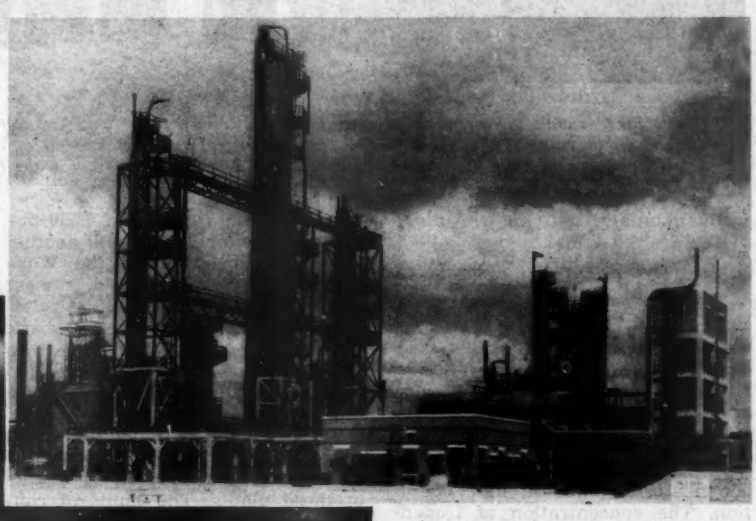
The extraordinarily high yields that are obtained with the isomerization process, even on a recycle basis, are shown in Table 3. Doubling the recycle ratio decreases the yield of neohexane concentrate only 2 per cent while effecting a considerable improvement on product. The bottoms are also valuable products which may be included in aviation gasoline. The liquid yield (neohexane concentrate plus bottoms) is 94.2 and 91.4 per cent for 1:1 and 2:1 recycle ratio, respectively. The butanes, consisting of 75 per cent isobutane, are valuable byproducts and if these are included the yield is slightly above 100 per cent by volume. The only loss is a small amount to dry gas.

Pan American Isopentane Plant

Just completed at the Texas City refinery of Pan American Refining Corp. is a 1,620-bbl. per day unit for isomerizing n-pentane to isopentane.

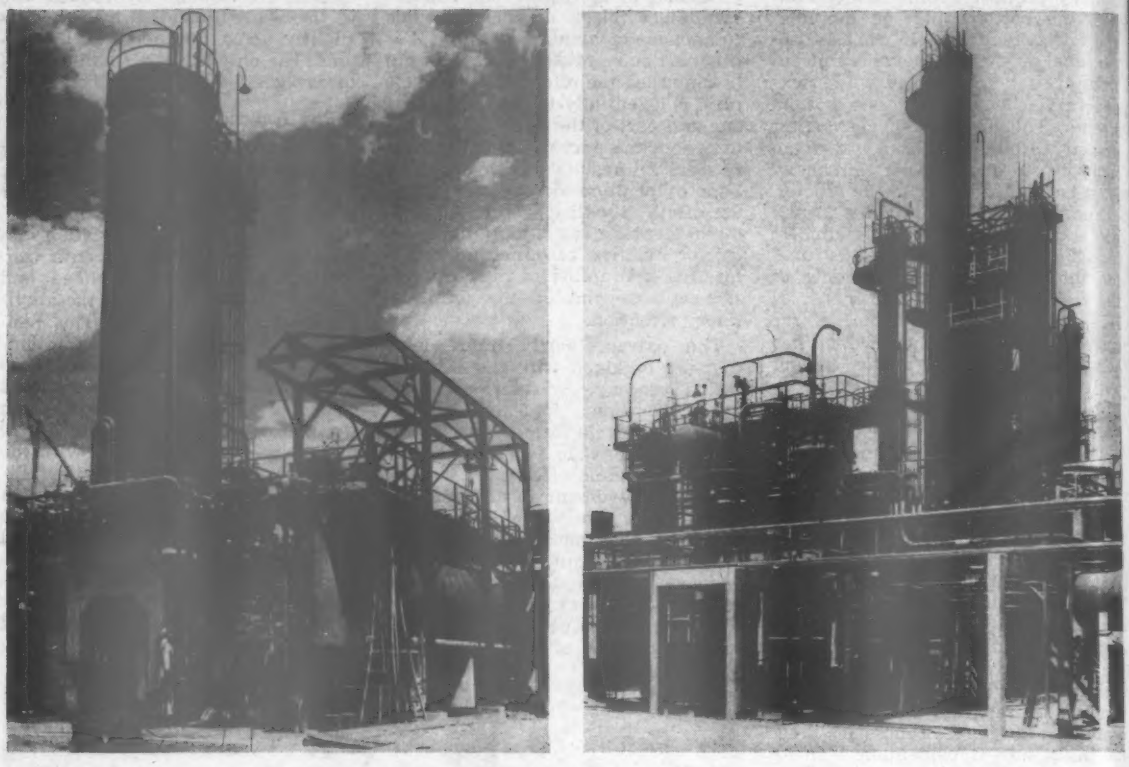
Product from the alkylation debutanizer enters the depentanizer. Pentanes are taken overhead and the bottom stream sent to the alkylation unit rerun tower. The pentanes enter the isopentane fractionation tower where isopentane contained in the feed is fractionated out. The n-pentane is taken from the bottom of the isopentane tower, dried, preheated, combined with the HCl and introduced near the bottom of the reactor. A small amount of inhibitor is added. The reactor itself operates on the same general principle as in the case of the naphtha isomerization reactor.

The pentane isomate, passing overhead from the reactor, is cooled and passes to the accumulator drum.



Right: Pan American pentane isomerization unit. Below: Fractionation towers of the Utah neohexane unit

This drum acts as a gas separator as well as a catalyst settling drum. The uncondensed gases, principally methane, are eliminated by intermittent or continuous venting. The accumulator liquid is pumped to the HCl stripper and HCl recycle taken overhead. The bottom product from the HCl stripper is cooled, washed with caustic and water to eliminate traces of HCl and is returned to the dependentanizer. The isomerized pentanes are returned to the dependentanizer instead of directly to the isopentane tower to remove a small amount of heavy ends. As described for the feed, the overhead from the dependentanizer passes to the isopentane tower where isopentane is taken overhead and debutanized



Left: Wood River butane isomerization reactor. Right: Utah neohexane unit. The tallest tower is the neohexane tower, at its left the debutanizer, at its right the depentanizer. The reactor system is at the left of the towers, while the spent catalyst storage drum is at lower right. The large vertical drum in front of the towers is a surge drum

in the debutanizer giving isopentane of the desired grade.

TABLE 4

Once-Through Yields on Pentane Isomerization

Reactor effluent:	Wt. %
Dry gas	0.1
Butane	1.7
Isopentane	62.0
n-Pentane	34.8
C_6 and heavier	1.4

In Table 4 typical yields are shown for a once-through operation. The concentration of isopentane in the reactor effluent is limited by the chemical equilibrium at the temperature of operation as shown in Table 2. As in the isomerization processes previously described, optimum operating conditions are determined by balancing reaction temperature, space velocity and HCl concentration. There is practically no degradation to dry gas. The C_6 and heavier product eliminated in the depentanizer are valuable constituents for aviation gasoline. The butanes are 80 per cent isobutane.

Whiting and Wood River Isobutane Plants

At the Whiting refinery of Standard Oil Co. (Indiana) a liquid-phase, butane isomerization unit having a reactor charge capacity of 4,530 bbl. per day is in operation, and another unit is in operation at the Wood River refinery having a reactor charge capacity of 4,250 bbl. per day. These units employ the same basic principles that have been described in connection with naphtha and pentane isomerization except for the inhibitors employed.

These units are integrated with alkylation plants and use the debutanizer and deisobutanizer towers of these plants. The limits of conversion are determined by the chemical equilibrium as shown in Table 2. A typical example of once-through butane isomerization is given in Table 5.

TABLE 5

Once-Through Yields on Butane Isomerization

Reactor effluent:	Wt. %
Dry gas	0.7
Isobutane	50.0
n-Butane	48.6
C^5 and heavier	0.7

Chemical and Engineering Development

The study of the isomerization of paraffin hydrocarbons has been conducted in the laboratories of this company for more than a decade. Several thousand laboratory experiments were made to accumulate extensive background in the field of isomerization. Pilot-plant development based on these fundamental studies resulted in operable, continuous and from a mechanical viewpoint, rather simple processes. As soon as the necessity for rapid expansion in aviation-gasoline production was realized, the results of the exploratory and pilot-plant experiments were carefully appraised from processing and mechanical engineering aspects and designs of large-scale plants undertaken.

Projected operations on a large scale necessitated reconsideration of problems concerning the handling of the various materials used in the processes at a time when special equipment was difficult to obtain. Means for continuously injecting granular materials into vessels operating under pressure were improvised using types of equipment already available. Many other problems were successfully solved in the construction of the five plants just described.

These commercial installations represent the combined efforts of the research, operating and engineering departments and the authors acknowledge the contributions by many members of the company to the success of this development.

Choke Control of Gulf Coast Wells—No. 2

by J. E. Loeffler

J. E. Loeffler, chief engineer for Thornhill - Craver Co., Houston, author of this series, which started in the October 21 issue on Page 105, graduated in mining engineering from Gonzaga University in 1913 and took a job as a roughneck for Callahan Oil Co. in the Humble, Tex., oil field, on "Moonshine Hill." Later he fired boilers in the field, dressed tools and worked at drilling.

In 1916 Loeffler joined the Ed Simms-Stati interests, first as a field engineer and later as petroleum engineer. From 1918 to 1925 he was petroleum engineer for Sinclair-Gulf Oil Co., Sinclair Cuba Oil Co., and Sinclair Mexican Oil Co., which had absorbed the Simms-Stati interests.

A position as construction engineer for Humphries-Pure Oil Pipe Line Co. came next, in 1927. About 2 years later Loeffler joined a Houston consulting engineering company. After several years with this concern he engaged in the manufacture of combustion apparatus for the oil industry. In 1939 he entered the engineering department of Thornhill-Craver.

REMOVABLE-TYPE beans were early used on the West Coast and were called plug flow nipples. This type of flow bean was held in a cage nipple which was called a flow-bean cage or flow bushing. The bean was screwed into a tee at the bend in the flow line. The cross was blanked off opposite the cage nipple, and opposite the flow line from the tubing head fitting, each with a bull plug.

The principal advantage of the positive choke is its simplicity and low cost. The bean is of high-carbon steel, carburized and heat treated for extreme hardness. To facilitate adjustment and replacement, beans are placed in the outlet of crosses or tees.

The most recent positive-choke assembly retains some of the basic design of those first introduced. However, there has been some decisive improvement in the assembly, manipulation, and in some of the parts. In Fig. 4 it will be noticed that the cage nipple, the removable flow bean, the tee, or central body are still being used, but instead of a bull plug, there is now substituted a flange, or fast coupling covering the bean replacement port.

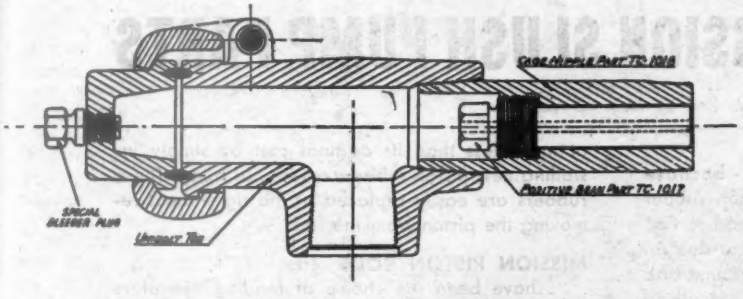


Fig. 4: Diagrammatic sketch of positive choke, showing body, cage nipple, removable bean, removable cover, and bleed plug

Utilizing this quick-change feature between the body of the choke and its blanking plug expedites the changing of beans and eliminates danger from poorly cut and leaky threads. This construction also avoids hazards in use of chain tongs on high-pressure trees. There has been added a bleeder plug to relieve the internal pressure from the body, to reduce accidents occasionally occurring from making the changes just mentioned. This is also shown in Fig. 4.

The positive choke is the most accurate of all the flow beans and for that reason it has been adopted in many cases for establishing flow potentials. The orifices can be of considerable length, such as 6 in. The length allows some normal wear at its entrance and exit, yet remains undisturbed for longer periods of time within the interior section.

The cage nipple is threaded on both ends to pipe size and threaded internally to accommodate the flow bean. Usually this nipple is made from seamless tubing steel, heat treated to obtain strength. The tee or cross body is usually made of carbon steel, in some cases, of S.A.E. 1020, and in other cases of S.A.E. 3140, depending upon the internal service rating desired.

The nominal sizes range from 2 in. to 3 in. with maximum opening of 1 in. There are generally two body types, one for 6,000 p.s.i. cold test and another for 10,000 p.s.i. cold test.

Beans for Positive Chokes

Beans for positive chokes are of several different styles, and are of heavy construction to withstand high-pressure conditions and sand scouring. They are often made of a solid piece of steel or forging 3 in. to 6 in. long. The diameter of the orifice through the bean may range from 1/64. in. to ¾ in. or more. The popular sizes of bores range from ⅛ in. through 9/64 in. to 5/32 in.; by far the majority are those 6 in. in length. The Texas standard proration bore is ¼ in. and length of 6 in. Other states may have variations. A pressure gage on the upstream side of the cage nipple indicates the back pressure in the well which should be maintained as steady as possible.

The material from which the forgings are made or from which the beans are formed is usually an alloy chrome-nickel steel, case hardened and heat treated. This may be S.A.E. 4140, heat treated to allow machining. With the threads protected in an appropriate manner, the completed bean is carburized

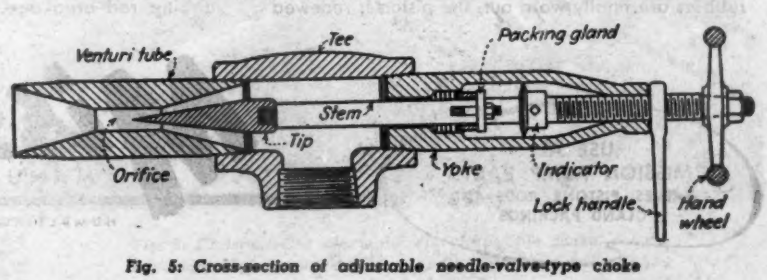


Fig. 5: Cross-section of adjustable needle-valve-type choke

control and regulation is through an orifice and a tip which is moved in and out by a hand wheel. The annular opening between tip and orifice is indicated on a scale. The bean and sometimes the stem tip are readily replaceable in many adjustable chokes.

The orifice is usually designed on the principle of a converging nozzle which allows fluid to flow through smoothly and with minimum turbulence. A greater volume of fluid will therefore pass through an orifice of given area of this type of bean bore than through the same area in straight designs.

When it is decided to bring in the well and gage it through choke, the adjustable type offers economy. Only one adjustable bonnet is necessary for a number of wells. As soon as one well is completed and producing, the adjustable bonnet can be replaced by a positive choke and used on the next well. Modern adjustable chokes, because of their removable flow beans, eliminate the hazard of using bull plugs on the choke body or piping.

The Combination Choke

A blanking plug and a positive bean such as described for positive chokes, interchange with the yoke assembly and stem seat to connect the adjustable choke to a positive type, Fig. 7. Very little time is required in making the change, and the body of the combination choke is generally made up in the well hookup as a permanent fitting or by using flanges or fast couplings. A standard proration flow bean may be inserted in the body and the bonnet replaced by a blank flange or blanking plug, to determine the allowable production of a well. A bleeder plug should be a part of either the blank flange or plug. In one type the removal of one bolt in the bonnet allows the coupling to be disengaged and the entire yoke assembly removed. This is also shown in Fig. 7. Thus it is an easy matter to change the stem seat or bean, or to convert the adjustable choke to a positive choke.

This type choke is usually located to function as an ell on each side of the flow line. It may be connected up so that the flow is either to or from the tip.

Proration of production is secured accurately by using the adjustable choke, since the allowable can be maintained with a small amount of variation.

It has been found that in some pumping and gas-lift wells, the application and control of back pressure by the combination choke frequently arrests decline and increases recovery.

The combination choke is being used extensively for holding back pressure on the circulating fluid during drilling and completion. This is especially necessary in pressure drilling where such devices must be relied upon to hold the overflows.

The nominal sizes of combination chokes range from 2-in. to 3-in. pipe size, with a maximum orifice bore in the flow bean of 1-in. diameter. There are body types for 3,000 p.s.i. cold working pressure, 6,000 p.s.i. cold test pressure, 5,000 p.s.i. cold working pressure, and 10,000 p.s.i. cold test pressure. These body types may be procured in tee bodies or cross shapes.

The stem in the combination choke is forged of an alloy steel, and the point or tip on the stem is replaceable by simply disengaging a flange or fast coupling at the bonnet connection to the choke body. The tip of the stem is usually conical; however, it may assume other more efficient shapes. Accurate centering of the needle tip in the orifice of the combination choke results in minimum and uniform wear on the needle and stem seat. This also results in even flow around the needle, thus minimizing turbulence and retarding any tendency of the fluid to form an emulsion.

One variation from the conical tip is a type which is parabolic. With this type, any movement of the wheel will increase or decrease the flow area the same amount at the beginning, in the middle, or at the end, or in fact at any point in the

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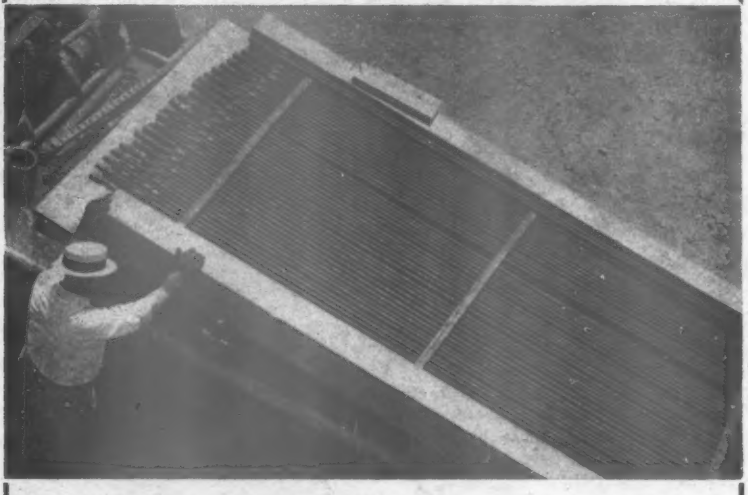

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travel of the tip. Also, very small openings can be secured with good control.

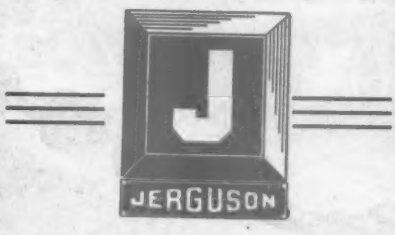
All combination chokes are provided with a stem locking device. It permits the locking of the flow-bean size at selected orifice openings.

The indicator mechanism is an important part of the combination choke, since the area of the opening through which the fluid flows should be known at all times. Generally, the indicator gage is fastened to one of the bibs of the yoke. The size of the opening is indicated usually by a disk which is fastened to the adjusting stem and moves along the gage. Scales calibrated to show orifice openings for either restricted flow or full flow or for maximum of ¾-in. bore or 1-in. bore are provided. These are changed in the field when the selected type of orifice is installed. The more modern arrangement is to use the accurately graduated micrometer-type scale. All the scales mentioned are usually calibrated in 64ths of an inch and normally register the exact amount of openings.

Installation of Surface Chokes

When mounting surface chokes, duplicate flow lines are used on many wells, so that a worn flow bean or cage nipple may be replaced by directing the flow through the second flow line without shutting in the well. The choke is placed close to the well head, adjacent to the christmas tree, or made a part thereof, on the flow line at a bend. The usual position is at a bend where the flow line leaves the tree. Sufficient swing joints to take care of temperature expansion and contraction should be considered.

Sand scouring of the flow lines and christmas-tree valves and fitting may be reduced to some extent by avoiding changes in the direction of flow and where right angled turns are necessary the flow should be cushioned with extension bull nipples. These are shown in Fig. 8 at each turn in flow line direction. The chokes and supporting fittings are customarily a part of the christmas-tree assembly and are received with it at the time of its purchase.



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Oil, Mineral-Deposit and Geologic Maps Offered

Publication of seven new maps of interest to many in the oil industry is announced by International Map Co., New York. Included are a new oil map of northeastern Venezuela, showing, in distinctive colors, the concessions of 11 companies as of July 1, 1944; oil map of Colombia, showing, in distinctive colors, concessions and leases of 11 companies as of March 1939; oil map of Near and Middle East, July 1938, showing oil fields, pipe lines, refineries and concessions; geologic map of Venezuela, by Ministry of Fomento, 1944; geologic map of Colombia, by Victor Oppenheim, 1943; map of the mineral deposits of the world, in eight sheets, published by Prussian Geological Survey, 1927; map of the mineral deposits of South America, in six sheets, by Dr. Richard Stappenbeck, 1927.

E. L. Rawlins, Union Producing Co., Shreveport, is chairman of a committee named by American Gas Association to serve in an advisory capacity to Interstate Oil Compact Commission. Other members are **C. E. Daniels,** Oklahoma Natural Gas Co., Tulsa; **J. G. Dickinson,** Texhoma Natural Gas Co., Amarillo; **R. E. Wertz,** Amarillo Gas Co., Amarillo.

Roscoe E. Shutt, head of the exploration department of Shell Oil Co., Inc., in the Mid-Continent region, has resigned to become an independent operator. He had been in Shell service 20 years.

Charles H. Thurber, formerly geological engineer for Stanolind Oil & Gas Co., is now assistant geophysicist for Plymouth Oil Co. at Sinton, Tex.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Rubber Roads

I have heard some talk of rubber as a highway material. Can you direct me to any information on this? —A.C.B.

The chaos that may result in the natural-rubber industry after the war is of great concern to plantation owners and perhaps is also troublesome to synthetic-rubber manufacturers in the United States. This has led to a search for some large-scale use for rubber. C. Ridley, in the April 1944 issue of the British publication, Petroleum, Page 59, discusses the use of rubber for roads, as follows:

"As long ago as 1870 a stretch of rubber road was laid outside the Midland Grand Hotel at St. Pancras railway terminus. Records testify to its longevity and lack of maintenance, such as tar spraying and sand gritting. Other stretches have been laid in other parts of London, such as in Blackfriars, Whitehall, etc. Huddersfield has the largest stretch yet laid. The most recent are those in Lombard Street in the city and Baker Street, Marylebone.

"The extent to which rubber roads have been subjected to practical test and trial is too small to enable any decision to be arrived at. Much wider-scale tests are necessary, and the large-scale road planning in London and elsewhere should include serious investigation of the rubber-road possibilities.

"With the prospect of rubber as cheap as 5d. per lb. (about 10 cents) against that of 1s. more or less of recent, fairly stabilized plantations costs, the whole position is changed, and with a sufficiently powerful combination of interests — highway authorities, rubber producers, motor-car manufacturers and the buyers and users of tires (if anyone could possibly persuade them to come out of their lethargy and take a hand in the game) — there is no reason why rubber roads should not be developed technically in the same way that synthetic rubber is being developed in the U. S. A."

Apparently the use of rubber-asphalt mixtures is being considered by scientists in Holland although no direct mention is made of roads. J. M. Van Rooijen published a paper in Ind. Eng. Chem. 33,820 (1941) entitled "The System Asphaltic Bitumen-Rubber Powder."

Ninety Per Cent Points of Different Gasoline Grades

What are representative 90 per cent points for gasoline being sold today? They seem high.—P.S.T.

Just what the 90 per cent temperature of a gasoline should be is not a simple question. A high 90 per cent point causes or contributes to large crankcase-dilution losses of fuel, it tends to decrease the octane number because high-boiling oils usually have a poor octane number, and it tends to make the gasoline exhibit poor acceleration or warm-up characteristics. Warm-up or acceleration is, however, affected much more by the temperatures at the 20 to 60 per cent points than by the 90 per cent point. Finally, high-boiling materials have a slightly higher heating value (per gallon) than low-boiling materials, but the practical difference is nearly negligible, particularly because the high-boiling portion may fail to vaporize or burn and hence its high heating value may not be utilized. One way to judge a suitable 90 per cent point is to examine other gasolines that are being sold. The Bureau of Mines has done this for the winter of 1943-44 in Reports of Investigations 3758, National Motor Gasoline Survey, by O. C. Blade. It shows 90 per cent points as follows:

	90% °F.	Range of 90% °F.
Third grade	348	(322-373)
Regular price	345	(293-396)
Premium price	342	(292-391)

Although the average 90 per cent is highest for third-grade gasoline, the highest extremes of 90 per cent points were among the regular and even premium price fuels. In part this may be due to the increased use of catalytically cracked naphthas which are being rejected from 100-octane plants because of their high boiling range but which have a good octane number.

According to Holaday & Happel (Trans. S.A.E. 1942) only about 1 out of 10 cars will suffer crankcase-dilution losses exceeding 5 per cent if the 90 per cent points of the distillation curve do not exceed the values shown here:

Operating temp. °F.	90% point °F.
—40	*240
0	*315
40	340
85	375

*Estimated by extrapolation.

Another Natural-Gas Book

The American Gas Association (420 Lexington Avenue, New York) book entitled Fuel-Flue Gases (price $4.50) has been called to our attention as a book that pertains to natural gas and its engineering and could be added to the listing on the September 2, 1944, page of Questions on Technology. This book presents complete physical data on the common gases of the gas industry.

What Is Enamel Wire Naphtha?

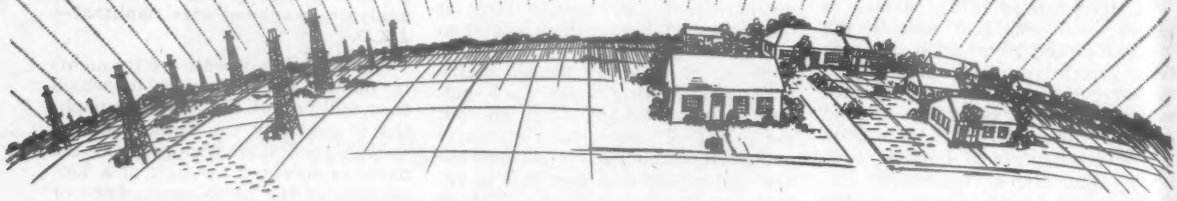
Can you direct me to literature pertaining to the characteristics (and analyses) of enamel-wire naphtha?—J.K.D.

Naphthas or solvents are frequently named from the use to which they will be put. Enamel-wire naphtha is probably the name used by some screen manufacturer and the name is accepted for lack of a better one by the petroleum refiner or supplier. Petroleum naphthas are widely used for the washing or rinsing of metals in paint shops and in cleaning machinery. Such naphthas are mentioned in connection with many others on Questions on Technology pages of March 4 and April 15, 1943. There is nothing of particular note about these naphthas except that they should be as high in flash point as possible without lowering the solvency power. Obviously, the higher the quantity of aromatic hydrocarbons contained in the naphtha, the better the solvency power; in other words, the smaller the amount of naphtha required to dissolve a given amount of grease or dirt. However, aromatic naphthas are somewhat scarce and more expensive than the petroleum naphthas that are usually available. Some of the naphthas used for metal washing or rinsing are tabulated here, the last one (No. 7) being a "high solvency" or aromatic naphtha and Nos. 2 and 4 are also available in aromatic types by some manufacturers.

No.	Gravity A.P.I.	Distillation range, °F. I.B.P.	10%	50%	90%	E.P.	Fish. °F. Tag. c.c.	Kauri butanol number
1.	59.5	200	210	217	232	247	25	38.5
2.	*37-58	200	215	232	253	286	25	39-69*
3.	58.0	220	230	250	270	300	45	38.0
4.	*35-50	303	317	328	352	376	99	35-63*
5.	50.0	312	322	337	368	380	..	33.0
6.	48.0	325	333	350	370	400	115	35.0
7.	*40.0	240	...	285		340	..	72.0*

*High solvency or aromatic naphthas.

25th Anniversary



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A FEATURE OF THE OIL AND GAS JOURNAL

PRACTICAL GEOLOGY OF OIL: DESCRIPTION OF OIL RESERVOIRS

A NATURAL reservoir of oil and gas is a trap or catchment area within the earth in which oil and gas accumulate. In many places these reservoirs appear to be areas in which the porous strata have been bent or broken in such a way that, although water under hydrostatic head will flow through, liquids like oil, which is immiscible with and lighter than water, are retained and trapped. This conception is best illustrated by gas bubbles flowing through a U-tube inverted in a basin of water. The gas will accumulate in the upper part of the U-tube until all the water is displaced.

Another and perhaps better conception is that oil reservoirs are spots of low hydrostatic pressure within a continuous liquid-saturated, porous sheet or stratum. The low-pressure area may be due to elevation of the reservoir area above the surrounding portion of the sand sheet, to fracturing and faulting, to a local expansion of the volume of the porous layer, to tension, or usually to a combination of these causes. Under these conditions gases and liquids lighter than water and under pressure tend to migrate to, and accumulate in, spots of relatively lower pressure and from which the water may be displaced downward or outward. Gases may change to liquids by pressure and chemical reactions, a process known as polymerization, and dissolve in liquids already in the reservoir. Thus the volume of hydrocarbons in the reservoir is reduced and concentrated.

In order to have a large accumulation of oil it appears to be essential that the porous stratum containing the oil and gas, and known as the reservoir rock, be fairly continuous or connected with porous layers of wide lateral extent. Further, the reservoir bed, in most places, is of marine origin and contains connate briny waters where not filled with oil. Finally, the porous layer or layers are overlain by impervious ones referred to as "cap rock."

More than 1,000 different oil reservoirs have been discovered in the Mid-Continent of the United States. These occur in different shapes, sizes, and capacities and originate in different ways. Clapp, Powers, Ver Wiebe, Harold, Wilson, and Cloud have studied these reservoirs and attempted to separate them into classes according to their shape or origin. Clapp, for example, divided oil reservoirs into 10 main classes according to shape. Wilson, on the other hand, classified reservoirs into two main divisions, closed and open, and subdivided them more or less on a basis of their mode of origin.

Classification of Reservoirs

Of the two methods of classification, shape and mode of origin, the latter is more useful, since it brings together reservoirs of similar origin and, hence, those which have more or less similar geophysical and production characteristics. The following classification, based on mode of origin, is helpful in evaluating reservoir performance and reservoir characteristics:

1. Reservoirs in structures produced by lateral compression. Examples, the elongate anticlines of the Dutch East Indies and Rocky Mountain provinces.

(a) Elongate domes and anticlines.

(b) Partly overturned, unsymmetrical, and faulted anticlines.

(c) Thrust faults.

2. Reservoirs in structures due to vertical upthrusting or flowage, or domal structures in which older rocks are pushed upward against or into younger ones. Examples, salt stocks, salt domes, and volcanic plugs.

(a) Deep-seated type structure in which the salt or igneous rock is not penetrated in the deepest wells, and younger rocks are not pierced.

(b) Intermediate type in which the deeper beds are pierced by the salt stock, but the shallower younger oil sand sheets pass over the top of the plug and are domed upward.

(c) Shallow type in which the shallower and younger sand sheets are pierced by the plug, and all the accumulation is around the periphery of the salt or volcanic stock.

3. Reservoirs in structures produced by the settling of sediments over buried hills. Examples, many of the domes and anticlines of Oklahoma and North Central Texas.

(a) Irregularly shaped, elongate domes and more or less symmetrical anticlines in which the sand sheets containing oil pass over the top of the buried ridge and are domed up.

(b) Domes and anticlines in which the ancient rocks formed land masses against which the sand sheets were deposited and later buried by younger sediments, which may or may not have passed over the top of the buried ridge. The deep oil reservoirs are elongate pools paralleling one side and, in a few places, both sides of the ridge. The shallower reservoirs may occur in the domed sand sheets above the buried ridge.

4. Reservoirs in structures due to tension. Examples, Mexia-Luling fault line reservoirs.

(a) Reservoirs produced by normal faults. These are long narrow pools along the upthrow side of the fault.

(b) Reservoirs produced by graben structures. These are long narrow pools along the basinward side of the graben. In some places the shallow porous beds within the downthrow block may contain some oil.

5. Reservoirs in traps produced by irregular porosity of the permeable stratum. Examples, stratigraphic traps such as East Texas field and Midway-Sunset in California.

(a) Sand lenses and lentils due to irregular deposition along ancient shore lines. An example is the "shoe string" reservoirs of eastern Kansas.

(b) Porous spots due to local volcanic activity, volcanic flows altered to some form of porous serpentine and erroneously referred to as volcanic "plugs." Reservoirs due to porous spots in igneous sills or dikes, if not associated with an anticline or other type of structure, would belong in this class also. Examples, Thrall and Hilbig serpentine reservoirs in Central Texas.

Each type or class of reservoir has certain definite characteristics which can be easily recognized after a few wells are drilled or after the structure has been outlined by geological or geophysical means. Once the type of reservoir is known the fact is of much importance in locating wells and planning drilling campaigns, because the shape of the pool and production characteristics of the reservoir depend upon its origin.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

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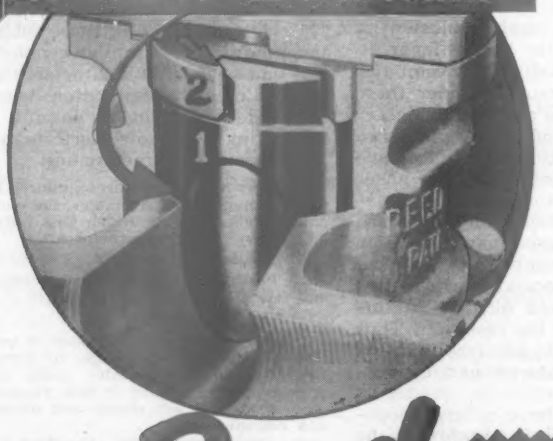

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Aromatic-Base Crude Oils

CRUDE oils rich in aromatic hydrocarbons are somewhat scarce in the United States and hence the term "aromatic or benzinoid base" is not common. Nevertheless, there are a few American crude oils, such as Mexia (Texas), Altamira and San Marcos (Mexico), Conroe (Texas), and Maljamar, (New Mexico), that might be classed as aromatic base. In Refinery Notebook No. 20 a composition diagram will show the chemical composition of these oils as well as the more common paraffin, mixed and naphthene-base oils. The figure here shows the composition of an aromatic crude oil throughout its entire boiling range. Some aromatic crude oils contain more aromatic hydrocarbons in the gasoline but few crude oils contain more high-boiling aromatics than the Grosny wax-free petroleum shown here. The aromatic content of some gasolines is shown in Table 1. The material boiling from 300° to 400° F. is usually rich in aromatics and hence the high end-point gasolines are disproportionately rich in aromatics.

TABLE 1—PERCENTAGE OF AROMATICS IN GASOLINE

	Per cent aromatics	Boiling point (°F.)
Chusov, Russia	46.4	(?)
Borneo	36.0	302
Conroe, Texas	27.6	356
Conroe, Texas	20.2	320
Mexia, Texas	17.5	302
Upton, Texas	17.3	402
Smackover, Arkansas	17.0	405
Burma	15.7	302
Maljamar, New Mexico	14.0	300
Breckenridge, Texas	15.9	406
San Marcos, Mexico	14.7	365
Altamira, Mexico	14.4	392
Yates (deep), Texas	13.9	406
Iranian	11.1	302

Gasoline.—Most aromatics have octane numbers in excess of 100 and when mixed with other materials or when used in an engine they behave as if they had even higher octane numbers. Nevertheless, some of the straightrun gasoline from aromatic crude oils are also rich in normal paraffin hydrocarbons and hence do not exhibit high octane numbers. The extra power contained in aromatic gasolines is indicated by the following comparison:

Oct. No.	Type	Power
92	Paraffinic	100
92	Aromatic	161
97	Aromatic	194
99	Aromatic	243
100	Paraffinic	124

Solvents.—The solvency power of aromatic naphthas or solvents is excellent, being surpassed only by the nearly pure aromatic coal-tar naphthas. Solvency is measured by such tests as aniline point, kauri-butanol number, and nitrocellulose-dilution ratio, all of which are direct tests of the solubility of aniline, kauri gum and nitrocellulose in the naphtha. The aniline points of aromatic gasolines range from 105°-135° F. whereas many pure aromatic hydrocarbons have aniline points below room temperature.

Other products.—Kerosenes usually require treatment with sulfuric acid or sulfur dioxide (Edeleanu) to improve the poor smoke point. (See Refiner's Notebook No. 20.) The smoke points of aromatic, naphthene and paraffin hydrocarbons are in the following proportions 1:3:9. Thus, a pure paraffin can produce a flame nine times as tall as a pure aromatic. Diesel fuel oils have poor ignition qualities (diesel index or cetane number).

Aromatics may be determined by sulfonating 30-40 cc. of the material with three volumes of 98 per cent sulfuric acid followed by settling and washing with soda and water. The difference in the aniline points before and after treatment is related to the per cent by weight of aromatics as follows:

Charge (°F.)	Aromatics (per cent)
9	5.9
18	11.5
27	16.8
36	21.9

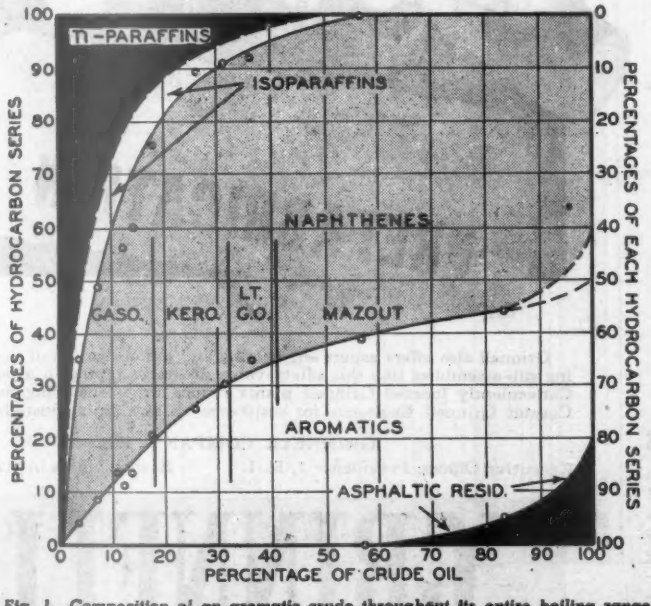

Fig. 1—Composition of an aromatic crude throughout its entire boiling range

No. 15 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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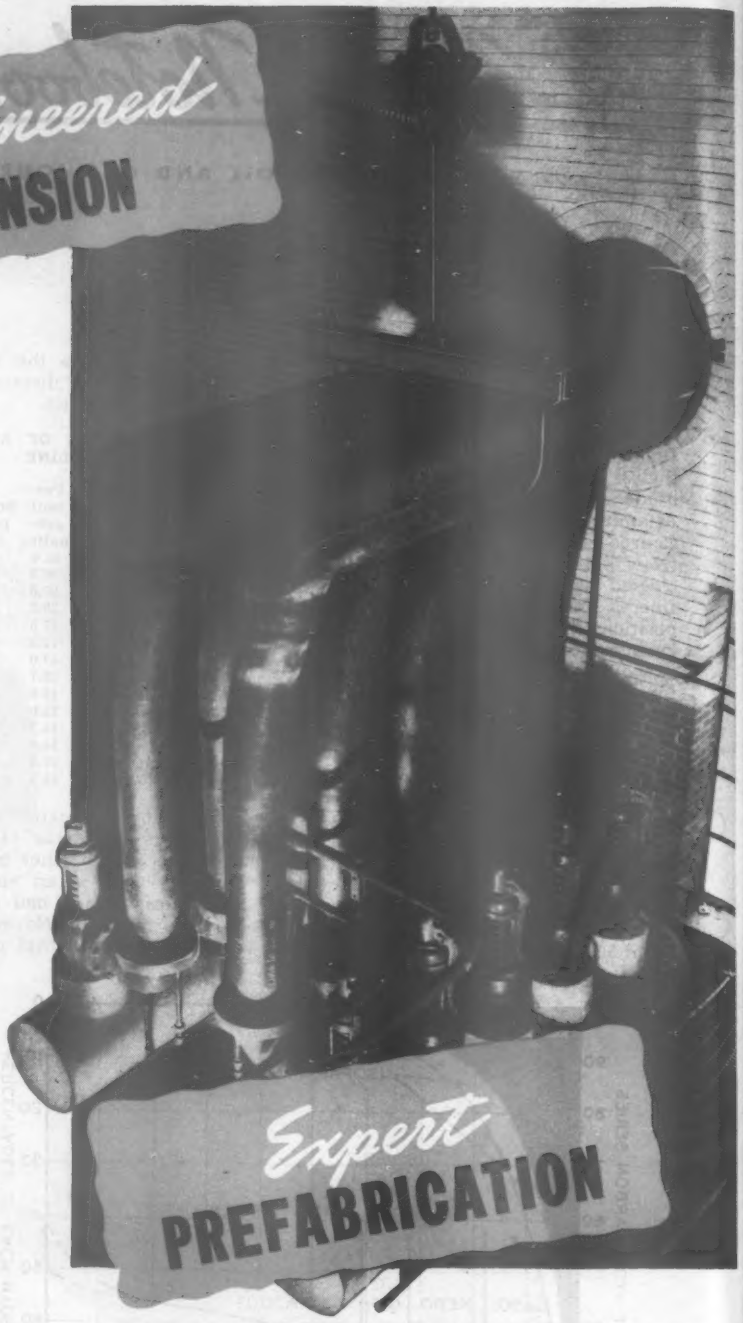

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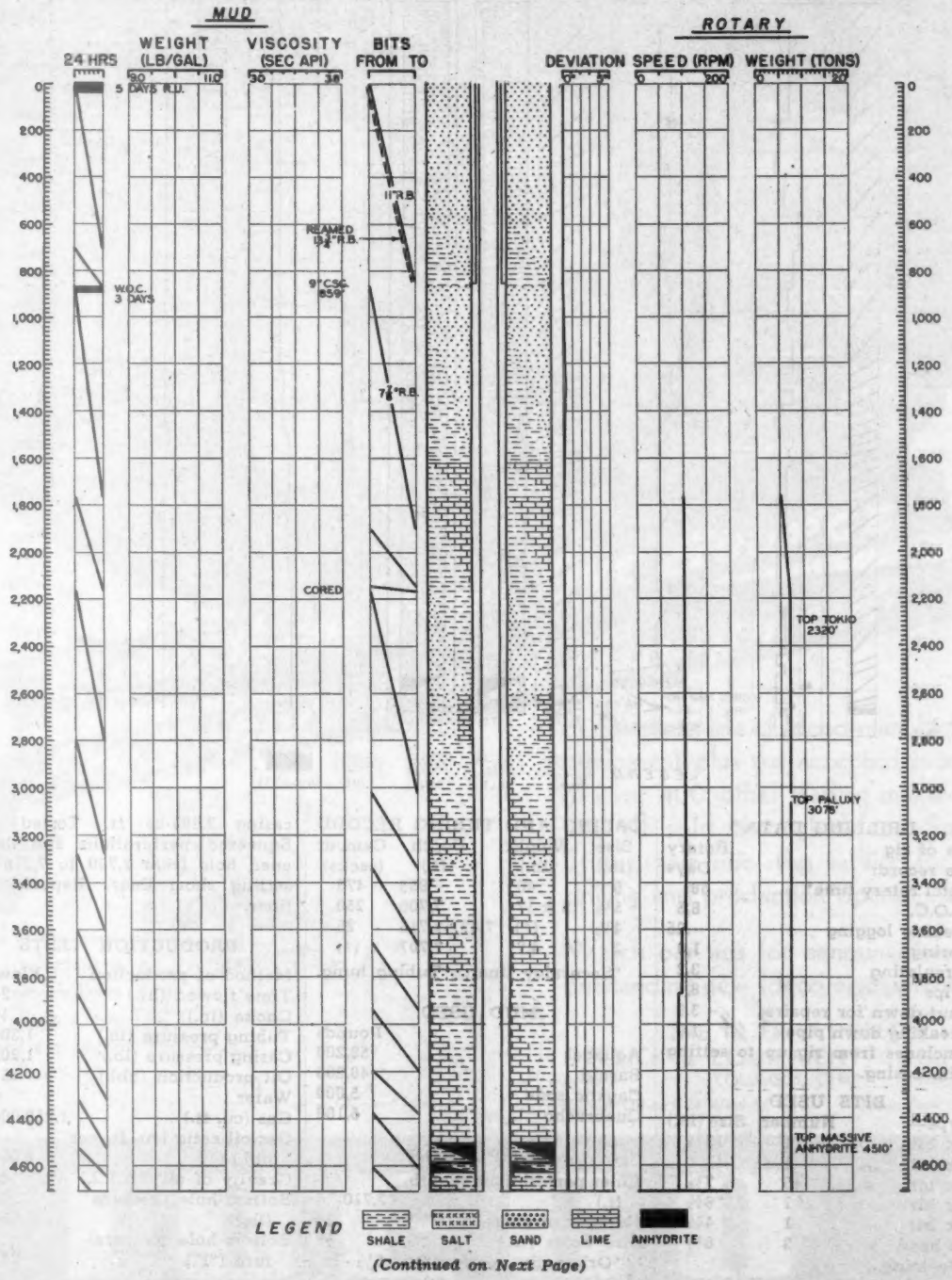
WHENEVER **PIPING** IS INVOLVED

Discovery Well, Eylau Pool, Bowie County, Texas

BARNSDALL OIL CO.-SOHIO PETROLEUM CO. 2 LOUIS HEILBRON
6,703 ft. from SL and 6,965 ft. from WL of lease, M. H. Jones Survey, elevation 305 ft. (derrick floor)

CONTRACTOR
Glenn Drilling Co.



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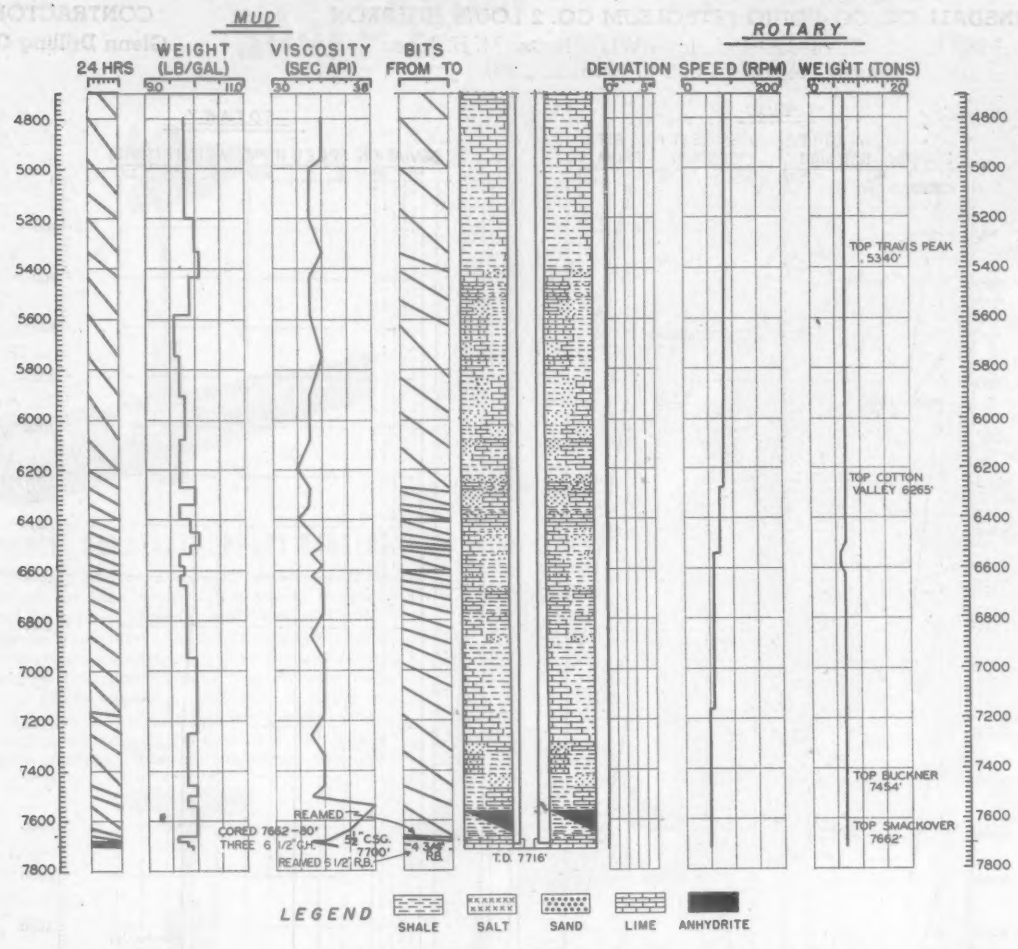
Journalog

Discovery Well, Eylau Pool, Bowie County, Texas (Continued)



DRILLING DATA

Type of rig	Rotary
Time record:	Days
Total rotary time*	58
W.O.C.	6.5
Electric logging	.25
Coring	1.0
Circulating	3.2
Trips	8.1
Shut down for repairs	3.9
Breaking down pipe	1.0

*Includes from rig up to setting 5½-in. casing.

BITS USED

Type—	Number	Size (in.)
Rock bit	1	13¾
Rock bit	1	11
Rock bit	45	7⅞
Rock bit	1	*6½
Rock bit	1	4¾
Core head	3	6½

*Reaming.

CASING AND TUBING RECORD

Size (in.)	Weight (lb.)	Depth (ft.)	Cement (sacks)
9	40	859	475
5½	15 & 17	7,700	250
4½	(*)	7,677-7,716	25
2	4.7	7,707	(†)

*Securaloy liner. †Tubing hung.

MUD USED

	Pounds
Aquagel	58,200
Baroid	48,300
Caustic soda	5,000
Quebracho	5,100

COMPLETION

Liner perforations (depth, ft.)	*7,710-14
Number of shots	24
Size holes (in.)	½

*Originally perforated 5½-in. casing 7,686-96 ft. Tested gas. Squeezed perforations and deepened hole from 7,700 to 7,716 ft., setting short liner. Reperforated liner.

PRODUCTION TESTS

Method of production	Flowing
Time flowed (hr.)	24
Choke (in.)	¼
Tubing pressure (lb.)	1,300
Casing pressure (lb.)	1,200
Oil production (bbl.)	155.25
Water	0
Gas (cu. ft.)	1,250,000
Gas-oil ratio (cu. ft. per bbl.)	8,050
Gravity of oil (°A.P.I.)	41.2
Bottom-hole pressure (lb.)	3,550
Bottom-hole temperature (°F.)	201

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Natural Gas

D. W. HARRIS

Harris Elected President Of Arkansas Natural

NEW YORK. — D. W. Harris, Shreveport, La., was elected president of the Arkansas Natural Gas Corp. here last week at the annual meeting of directors. Harris has served as vice president and general manager of the company and its subsidiaries, Arkansas Fuel Oil Co., Arkansas Louisiana Gas Co., and Arkansas Pipeline Co., since 1928.

Under his management the company has had a steady growth and is one of the leading oil and natural gas operating groups in the South. It pioneered in the discovery and development of the East Texas oil field and the Rodessa, Sligo, and Lincoln Parish, Louisiana fields.

In the new Carthage, Texas, field, which the industry expects to be one of the largest natural-gas pools in the world, the company has 22,000 acres of proven and potential holdings. Extensive acreage in the oil and gas areas of Mississippi and Alabama are also held by the company.

The new president of the Arkansas Natural Corp. has held several official positions with Cities Service Co., and its subsidiaries in Denver, Bartlesville, Okla., and in New York. He is a director of the American Gas Association, a member of the Bankers Club of New York and has been active in all affairs of the oil and gas industry.

Commission Denies FPC's Authority Over Gas Use

WASHINGTON.—Federal Power Commission is without authority to decide uses to which natural gas piped from one state to another may be put, according to the Texas Railroad Commission's brief filed last week by Asst. Atty. Gen. David Heath, who had presented oral arguments to the commission on the state's contention earlier in the week.

The Texas intervention is in the application of Memphis (Tenn.) Natural Gas Co. to increase its facilities for serving Memphis with natural gas. The commission on June 10 denied the application, on the grounds that the Louisiana field, the source of supply, has a limited life, and that reserves should be conserved for domestic and superior uses.

The commission found that 63 per cent of the Memphis use was to be for industrial purposes, and 90 per cent of that for generating steam in boilers, which was considered an inferior use.

The Texas commission contends that FPC may not predicate a denial on the basis that the use is inferior, and that FPC has no authority to pass on the use to be made of gas.

An opposite view was taken by Louisiana, represented by former Gov. Sam Jones for the state and the Department of Conservation. Jones contended FPC does have authority to pass on the use of natural gas. He stated that since the states do not have power to control the use of gas shipped out of its area, no one can regulate the use if FPC cannot.

FPC Thursday began hearings on the application of the Louisville Gas & Electric Co., joined by the city of Louisville, Ky., to tap the Tennessee Gas & Transmission Co.'s big pipe line from Corpus Christi to West Virginia to the extent of 10,000,000 cu. ft. a day for domestic needs of Louisville, and of the Kentucky Natural Gas Co. to tap for 4,000,000 cu. ft. to supply smaller towns in western Kentucky.

Construction Started on Two Carbon-Black Plants

ODESSA, Tex.—Construction was started last week on two carbon-black plants 6 miles west of here. An entire section of land was bought for the site. The plants will be under the direction of Defense Plant Corp., with United Carbon Black Co., Charleston, W. Va., as operator. The contractor is Ford, Bacon & Davis, of New York.

An appropriation of $500,000 has been made to cover materials, machinery and equipment. Channel-type plants will be built.

Cycling

Cycling Plant Started in North McCallum Field

DENVER. — Continental Oil Co. has under construction in the North McCallum oil field near Walden, Colo., the first unit of a cycling plant which in many respects is unique in oil-field installations.

The North McCallum wells produce carbon dioxide gas which contains crude oil. The company has been operating a pilot plant in which it has solved the problem of recovering the oil from the gas after considerable research and experimentation. The processes developed in the experimental plant are being incorporated into the operating unit. The unsual problem encountered when the field was discovered was to make the wells produce, the gas and oil coming out at such extreme low temperature as to freeze the mixture to the consistency of ice cream. Through regulation of pressure and temperature this difficulty was overcome and wells now are brought in flowing. The next problem was to separate the oil from the gas. An improvised system of heating the output was the first step and gradually the method was improved in the pilot plant until a solution was found.

The unit under construction is designed to handle 32,000,000 cu. ft. of carbon dioxide gas and 700 to 800 bbl. of the oil daily from five wells. After the oil is recovered the gas is to be reduced to a liquid and pumped back into the sand to maintain reservoir pressure through its expansion back into gaseous form. Since the gas will not burn and no other fuel but oil is available, the power for the generator and compressor will be obtained from the operation of diesel engines. The installation includes not only the cycling unit but a permanent camp, including office building, housing, shops, etc. The gathering and input lines will consist of 31,000 ft. of 4-in. and 4,800 ft. of 6-in. pipe.

REFINING

Sun Starts Operations of Luricating-Oil Plant

PHILADELPHIA.—Sun Oil Co.'s $7,000,000 lubricating-oil plant at Marcus Hook, Pa., is now on stream, J. Howard Pew, president, announced. The plant, one of the largest solvent refining composite units in the world, marks the next-to-last link in Sun's program started in 1939, for maximum war production. The final link, a thermofor catalytic cracking unit for production of additional aviation gasoline base stock, is in the final stages of completion.

The new lubricating-oil plant was built to meet Army and Navy needs for aviation lubricating oils with extraordinary qualities demanded by fighting planes. This plant was financed entirely by Sun and raised to more than $25,000,000 the total amount it has spent on facilities for war products.

The plant is unique in that it consists of a combination of several refining sequences operated continuously. It comprises four units built around the duo sol process, the MEK (methyl-ethyl-ketone) benzol dewaxing process and the filtrol fractionation process. These are tied together through the vacuum distillation charge unit which has a charging capacity of 14,600 bbl. a day of reduced crude drawn chiefly from Mid-Continent and Gulf Coast sources.

A feature of the plant is its extreme flexibility in type of stock charge, and range of viscosity, viscosity index, flash, fire, pour point, and other pertinent qualities.

Koch and Ingram Purchase O'Shaughnessey Interest

WICHITA, Kans.—Fred C. Koch, Wichita engineer, and O. H. Ingram, of St. Paul, have purchased the interest of I. A. O'Shaughnessey in the refinery at Hartford, Ill., of Wood River Oil & Refining Co. Koch and Ingram are officers of the company, and O'Shaughnessey formerly was president. The Hartford refinery has a capacity of 17,000 bbl. a day.

At the same time the company acquired the O'Shaughnessey interests in Globe Oil Barge Co., which operates towboats and barges on the Mississippi River. The deal included the Wood River terminal at St. Paul.

The refinery at Hartford is on the Mississippi just below Alton, where the Missouri empties into it, giving the company water transportation and delivery facilities for its products.

Asphalt Directive Abolished by PAW

WASHINGTON. — Revocation of the Petroleum Administration for War's Directive 66, which specified

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the types of asphalt that could be manufactured was announced last week.

Directive 66 originally was issued to assure an ample supply of asphalt and to make certain that transportation and storage facilities would not be overburdened with many different grades of asphalt.

The directive was revoked because the supply of asphalt is now sufficient to meet all demands, while transportation and storage facilities are adequate.

Wainwright Fractionating Tower in Operation

WAINWRIGHT, Alta. — Gold Standard Oils has put in operation at its refinery here a recently completed fractionating tower, expanding the capacity and range of the plant which now produces high-quality gasoline and several other grades of fuel from the Wainwright heavy crude.

Ashland Workers Go Back At Directive of WLB

ASHLAND, Ky.—Complying with a back-to-work directive issued by the regional War Labor Board, employes at Ashland Oil & Refining Co.'s No. 1 plant at Catlettsburg went back to their jobs last week after a 3-day strike, which caused a plant shutdown.

It is understood that Oil Workers International Union, with which the striking local is affiliated, supported the position of the company in the strike. Action of the company, in discharging one employe and suspending two others for "insubordination" which led to the strike, was sustained in the settlement.

Fuel-Oil Rationing Through Winter Seen by Seubert

SALT LAKE CITY.—Though the oil situation is "beginning to ease already," rationing of fuel oil probably will be continued throughout the coming winter, Edward G. Seubert, president of Standard Oil Co. of Indiana, said while here inspecting the new aviation-gasoline plant built by Utah Oil Refining Co., a subsidiary.

"Once the war is over, the story will be different," said Seubert. "There will be plenty for all and as good gasoline as postwar cars will require."

Seubert estimated that Standard of Indiana's plants, including $90,000,000 worth of facilities built especially for the war effort, are now producing enough aviation gasoline "to put about 1,000 flying fortresses over the battle lines in Germany every day." He hoped that when peace comes a way can be found to utilize most of these war-born facilities.

Strikers Resume Work at Aviation-Gasoline Plant

PORT ARTHUR, Tex. — A sympathy strike by 3,000 C.I.O. oil workers ended last week at The Texas Co.'s aviation-gasoline refinery here when the company consented to rehire 21 riggers' helpers. The strike lasted 7 hours.

Ray Andrus, chairman of the workmen's committee, said the walkout by members of International Oil Workers Union local occurred following discharge of 21 riggers helpers who declined to be transferred from the steel department to the labor gang.

Andrus earlier had reported that fires were being extinguished at the refinery, halting production of war-vital 100-octane gasoline. The Texaco plant is one of the largest in the nation and employs some 5,000 persons.

Andrus and James P. Hubbard, labor conciliator, advised the men to return to work.

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PIPE LINES

Sun Lays Line West Of Corpus Christi

Sun Pipe Line Co. has begun construction of a 30-mile crude-oil line of 6-in. and 8-in. pipe near Alice, Tex., 50 miles west of Corpus Christi. Laying has been contracted by Allied Welding & Engineering Co.

Phillips, Sohio to Start Line From W. Edmond

Phillips Petroleum Co. and Sohio Petroleum Co. were preparing early this week to award a contract for laying a 21-mile 8-in. crude oil line from the West Edmond field, Oklahoma, to a connection with Standish Pipe Line Co., a Phillips subsidiary. The line will be built of reclaimed pipe. Construction is expected to start soon. The undertaking has been approved by Petroleum Administrator for War and War Production Board.

Sohio interests are reported to have recently contracted with Al Johnson Pipe Line Service Co. for the laying of 5½ miles of 8-in. in the West Edmond area.

Tennessee Co. to Move Office in Houston

Tennessee Gas & Transmission Co. is having the sixth and seventh floors of the Commerce Building, Houston, entirely rebuilt with new furnishings of the most modern type for headquarters offices which will be established there December 1 when the company will move from the National Standard Building.

The final tie-in for the building of the Kentucky section of the Tennessee company's 24-in. main-transmission line was made in the first part of this week. At that time the only pipe laying remaining to be done was that for a short section of 3 or 4 miles in Tennessee. Testing has been done along this line from Corpus Christi, Tex., to Cornwell, W. Va., so that deliveries of natural gas can be made at eastern connections soon after the final weld has been made in Tennessee, probably some time this week.

Connection with the Hope Natural Gas Co. system will be made at a time when the large deliveries of gas from new sources in the Southwest will be available to offset the damaging effect of the fire destroying gas liquefaction and storage facilities of its affiliated company, East Ohio Gas Co. at Cleveland.

Tennessee Line Gas Is Sought for Alabama

WASHINGTON. — Federal Power Commission last week announced application by Alabama - Tennessee Natural Gas Co., Florence, Ala., for a certificate of public convenience and necessity to construct facilities to make natural gas available to the Reynolds Metal Co., Listerhill, Ala., Tennessee Valley Authority at Muscle Shoals, Ala., and the National Utilities Co. which now furnishes manufactured gas to the cities of Florence, Sheffield and Tuscumbia, Ala.

The proposed pipe line will con-

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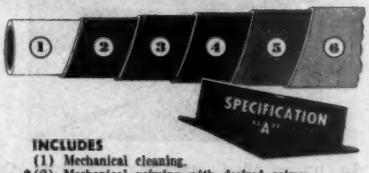

INCLUDES
(1) Mechanical cleaning.
*(2) Mechanical priming with desired primer.
(3) Hot application of desired coating.
(4) Hot application of desired coating.
(5) One spiral wrapping of desired wrapping material.
(6) One spiral wrapping of heavy kraft paper.

INCLUDES
(1) Mechanical cleaning.
*(2) Mechanical priming with desired primer.
(3) Hot application of desired coating.
(4) Hot application of desired coating.
(5) One spiral wrapping of desired wrapping material.
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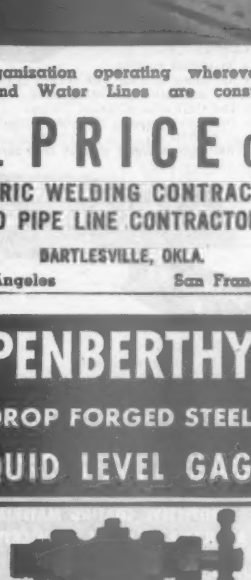

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PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

sist of approximately 66 miles of 10¾-in. transmission pipe line originating at a point of connection with the pipe line of Tennessee Gas & Transmission Co. near Enville, Tenn., and extending to the plant of Reynolds Metal Co., near Muscle Shoals.

The estimated cost of the project is $1,350,186, to be financed through issuance and sale of securities. The application states that the "proposed pipe line will serve natural gas to war industries and essential civilian users in the area in which it proposes to operate." These industries and consumers are now without natural gas and are anxious to obtain its benefits, the application says.

The Alabama-Tennessee Natural Gas Co. was organized for the purpose of constructing and operating the facilities covered by the application.

Eastern Buys Equipment From Jones & Brooks

Through a recent transaction between two Dallas firms Eastern Construction Co. has acquired the pipeline construction equipment of Jones & Brooks.

Pipe Lines Considered For the Near East

There are prospects for extensive construction of crude-oil pipe lines in the Near East when arrangements have been completed and the war situation is favorable for obtaining authorization for procuring steel. Projects mentioned include increasing the facilities of Iraq Petroleum Co., Ltd., in Iraq and Palestine, and the laying of a system to serve interests of Standard Oil Co. of California, The Texas Co. and Gulf Oil Corp. in Arabia and Kuwait. Proposals for these and other companies are said to involve the laying of a total of 1,500 to 2,000 miles of line.

Proposed Line Would Give Kansas City More Gas

KANSAS CITY. — The projected pipe line which Cities Service Gas Co. seeks to add to its system in the Hugoton field would result primarily in giving more gas to the eastern part of the state, R. T. Wells, chief engineer, said at a hearing here last week before Federal Power Commission. The increased delivery, he said, would mean a total of 14,261,000 cu. ft. of gas daily, of which about 3,000,000 cu. ft. would reach greater Kansas City.

About 1,000,000 cu. ft. would go to the St. Joseph area and 1,500,000 to the Chanute, Kans., district, he said. Wells told the commission the pipe line would not increase the daily total peak flow of 562,666,000 cu. ft.

The proposed line would be a 48-mile, 16-in. link between Shidler, Okla., and the present line in Washington County, Oklahoma. It would supplement the 231-mile, 26-in. line from Guymon to Blackwell, Okla.

Glenn Clark, general counsel for the company, said the cost of the line would be financed out of company cash and bank balances on hand.

World's Largest Owner of Tankers Is United States

NEW YORK.—Tankers now owned and controlled by American operators, along with others to be built within the next few months, will "total a greater carrying capacity than the entire world fleet in 1940," according to James P. Patterson, marine manager of Pan American Petroleum & Transport Co.

Patterson estimated that "we will have a world surplus of 8,300,000 deadweight tons of carrying capacity the first postwar year, 6,800,000 the second year, and 5,300,000 the third year."

An offsetting factor, he said, probably would be the scrapping of approximately 2,000,000 deadweight tons representing an old fleet built in 1923.

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Exploration and Drilling

Week's Highlights

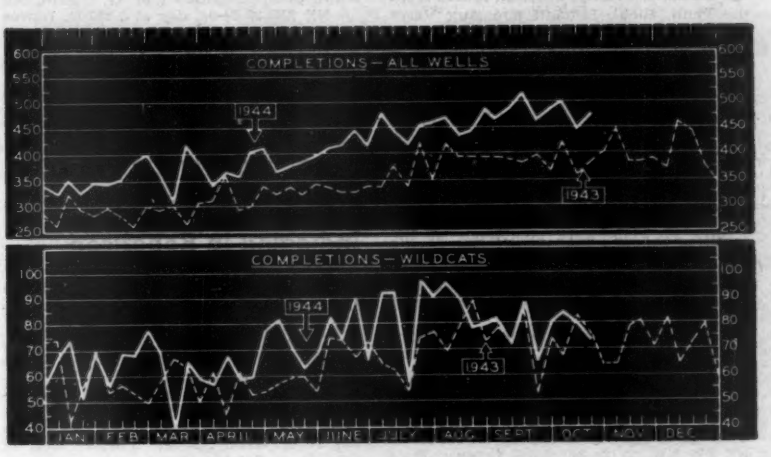
REPORTS of an active lease play around the north rim of Anadarko Basin in Oklahoma, based on potential Hunton lime stratigraphic traps, are not surprising. Interest in stratigraphic traps has been growing steadily for several years, and developments at West Edmond field were bound to increase that interest. This increase in interest has not been accompanied by a similar rate of progress in solving the geological problems involved in locating such traps, at least in solving them cheaply.

It is possible to outline the geological basins, around the rims of which traps are definite probabilities. It is possible to outline roughly the belts or zones, around the rim of the basin, within which individual formations should pinch out, thereby affording opportunities for traps in that particular formation. More specific delimitation is difficult.

In older producing areas, oil-bearing stratigraphic traps have been found by drilling on the basis of geological data, which at the time of drilling was assumed to be a structural reflection. Since petroleum geology is a "probability science," it is possible that reexamination of the "structural geology" of several of these producing traps may produce results. Some common, seemingly structural geological reflection may be the key to finding other traps in the area.

When various bits and pieces of geological evidence in an older area seem to fit into a favorable pattern if some key bit of evidence could be secured, and that evidence might have been available had more accurate logging methods been known when the original development took place, then radio-active methods of relogging some of the old wells might be profitable in securing the missing data. This might be a case where ability to log through the casing would be valuable.

But when all is said and done, there still arises the old problem of probably having to drill many dry holes to pin down the trap. At shallow depths, there are possibilities in using cheap and portable slim-hole drilling to cut down the expense. But the field is wide open for a cheap, portable, very slim hole drilling rig that can go deep.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

Week ended October 21, 1944

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.*	56	24	9	89	141,716	2,806	2,770
Ohio	6	9	12	27	54,473	810	744
Indiana	3	0	2	5	12,162	205	181
Kentucky	5	1	13	19	34,345	602	346
Illinois	17	0	17	34	90,403	1,510	1,431
Michigan	4	2	11	17	44,437	536	489
Kansas	7	0	20	27	104,863	1,461	1,337
Nebraska, Missouri, Iowa	0	0	1	1	4,664	32	41
Oklahoma	22	1	16	39	155,211	1,450	954
Texas:							
North Central	13	0	10	23	84,932	1,170	1,190
West	33	0	11	44	287,810	1,267	716
Panhandle	5	2	2	9	31,330	216	146
Eastern	2	1	1	4	24,070	259	236
Gulf Coast	23	0	4	27	183,615	1,011	370
Southwest	7	1	13	21	103,286	561	742
Total Texas	83	4	41	128	715,043	4,484	3,400
Louisiana:							
Northern	1	0	5	6	24,289	256	258
Southern	8	0	3	11	86,707	386	289
Total Louisiana	9	0	8	17	110,996	642	547
Arkansas	2	0	2	4	27,094	176	212
Mississippi	1	0	1	2	9,844	113	75
Southeastern States	0	0	1	1	3,850	42	†
Montana	6	0	4	10	22,718	292	186
Wyoming	3	0	0	3	13,135	139	113
Colorado-Utah	0	0	0	0	0	29	21
New Mexico	8	0	0	8	33,270	314	189
California	38	1	7	46	173,371	1,611	1,083
Total United States	270	42	165	477	1,751,595	17,254	14,119
Total previous week	265	44	137	446			
Total Oct. 23, 1943	220	33	126	379			

*Does not include 54 service wells. †Included in total shown for Mississippi.

ILLINOIS

Albion Pool, Edwards County, May Be Five-Sand Producer

CENTRALIA, Ill.—The Albion pool in Edwards County, which produces from the Penn, Biehl, Renault and Aux Vases formations, was given a showing of oil in McClosky lime by Gulf Refining Co. 1 Susan A. Webb, SE NE SW 1-3s-10e. It bailed 8 gal. of oil and 3 gal. of water per hour from lime pay at 3,185-92 ft. and was acidized.

Central Pipe Line Co. 1 Rose, SE NE SE 4-5s-3e, Franklin County, 2 miles from production, on a drill-stem test of McClosky lime at 2,973-79 ft. got gas in 6 minutes and 1,230 ft. of clean oil, 60 ft. of oil-cut mud and no water.

Only 34 wells were completed in the week, including 17 oil wells, with initial production of 2,310 bbl., and 17 dry holes, including 7 wildcat failures. Only 38 new operations were reported, including 5 wildcats.

New wildcats started included Reward Oil Co. 1 C. C. Walker, SE NW NW 13-6s-7e, Hamilton County; Walter Vette 1 Ware, SW NE NW 15-9n-4w, Montgomery County; Union Producers Petroleum Corp. 1 Accornero, NE NW NE 26-4n-4w, Bond County; Daugherty & Clark 1 O. R. Clark, NE SW NW 32-12n-8e, Coles County; Pure Oil Co. 1 L. F. Arnold B, NE NE NE 14-6n-10e, Jasper County.

ILLINOIS WILDCAT COMPLETIONS

Bond County: Lynch & Rea 1 Yohlker, NW SW SW 31-4n-2w, dry at 1,137 ft. No log.

Clark County: W. H. Wright 1 Cora Hight, C W½ NW NE 32-9n-14w, dry at 2,570 ft. No log.

Effingham County: Shulman Bros. et al 1 Loveless, NW SE NW 20-8n-4e, dry at 1,782 ft. Benoist sand at 1,759-68 ft.

Fayette County: Deep Rock 1 Albert, SE SE NW 33-5n-1e, dry at 1,877 ft. Menard 1,100 ft., Paint Creek 1,584 ft., Benoist 1,620 ft., Aux Vases 1,652 ft., Fredonia 1,796 ft., St. Louis, 1,877 ft.

Jefferson County: Deep Rock 1 Interstate Coal, SE SW NW 4-4s-1e, dry at 3,984 ft. Menard 1,923 ft., Cypress 2,392 ft., Benoist 2,550 ft., Aux Vases 2,623 ft., McClosky 2,836 ft.

Wayne County: A. J. Hammer 1 Williams, SW NW SE 3-2s-9e, dry at 3,476 ft. Menard 2,508 ft., Tar Springs 2,640 ft., Barlow 2,970 ft., Renault 3,247 ft., Aux Vases 3,276 ft., Fredonia 3,374 ft.

White County: Amsco 1 M. G. Austin, NE NE SW 28-6s-9e, dry at 3,225 ft. Lower Kincaid 2,007 ft., Cypress 2,741 ft., Benoist 2,961 ft., Aux Vases 3,028 ft., McClosky 3,169 ft.

EASTERN TEXAS

New Shallow Field Indicated in Robertson

DALLAS.—Incomplete field reports late last week indicated that a new shallow oil field has been uncovered in western Robertson County, about 50 miles southwest of Mexia and 45 miles south of Waco. No information has been released by the operators but reliable reports indicate that Hammon Oil Refining Co. 2 P. C. Gibson, on a 653-acre tract in the Jesse Webb Survey, 5 miles west of Calvert, is flowing at the rate of approximately 250 bbl. of pipe-line oil daily from sand, possibly the Nacatoch, encountered around 2,000 ft. A number of shallow holes have been drilled in this general area during the past several years and some of them had good, but small, shows of oil and gas. The 2 Gibson is 950 ft. northeast of Hammon 1 Gibson, a dry hole.

Rusk County.—H. C. Owen 1 Rousseau, Wilkerson Survey, which showed good porosity and odor in the Pettit lime at 7,095-7,125 ft., has cemented casing at 7,429 ft., total depth 7,512 ft., and will test porous Travis Peak sands at 7,360-70 and 7,380-90 ft. before testing the Pettit zone.

Van Zandt County.—Humble Oil & Refining Co. 1 Bruce, 4 miles south of Edgewood, was coring at 8,613 ft. Cuttings from 8,524-36 ft. showed hard fine-grained sandstone with slight oil stain. Northern Ordnance, Inc. 1 Shelton, near Martin's Mill, perforated casing at 8,279-90 ft., opposite the Rodessa section, treated with 2,500 gal. of acid, and after swabbing several days was recovering salty water with a slight show of gas.

EAST TEXAS WILDCAT COMPLETIONS

Bowie County: Steward Oil 1 A. E. Stewart, M. D. Ellis Sur., A-189, 6 mi. N New Boston, dry, TD 1,990 ft.

PERMIAN BASIN

Magnolia Pecos Wildcat May Open Ordovician Pool

MIDLAND.—Magnolia Petroleum Co. 1 state-Hart, wildcat in Section 8, Block 3, H&TC Survey, south of the Abell field in northern Pecos County, may open a new Ordovician pool. It topped sand at 5,558 ft., had sand with stains and some porosity from 5,583-5,602 ft., and was preparing to make a drill-stem test at total depth of 5,609 ft. It is believed in the McKee section of the Simpson formation. Humble Oil & Refining Co. 1 Dow-Puckett, Pecos County wildcat 11 miles southwest of Fort Stockton, failed on an attempted drill-stem test at 3,067-3,147 ft. when tool failed to close, and was drilling ahead past 3,170 ft.

Magnolia Petroleum Co. 1 L. D. Johnson, Lubbock County wildcat 3 miles southeast of Idalou, also was preparing to make a drill-stem test after logging lime with slight oil stain and odor from 6,250-6,311 ft., total depth. With elevation of 3,166 ft., this well topped the Clearfork at 4,580 ft.

Sun Oil Co. 1 Martin, new Andrews County discovery in Section 17, Block A-41, PSL Survey, swabbed 2 bbl. of oil per hour after treating the San Andres lime at total depth 4,381 ft. with 4,000 gal. of acid. In same county, The Texas Co. 1-L University, new Holt pay discovery on the east flank of the Emma pool, was completed for 541 bbl. daily, gas-oil ratio 595 to 1, from pay at 5,310-30 ft.

Ector County.—Shell Oil Co., Inc., and Cities Service Oil Co. 1 TXL was drilling below 9,135 ft. in lime and shale, probably in upper Ordovician. On a drill-stem test at 8,800-47 ft., open 60 minutes, it recovered 90 ft. of mud, 4,970 ft. of clean 31.8°-gravity oil, and 1,730 ft. of salt water, with about 1,500,000 cu. ft. of gas. A subsequent test from 8,848-90 ft. recovered only 15 ft. of mud. It previously has shown for a heavy producer from the Devonian lime. The joint owners of this test have made a deal with Geo. C. Fraser et al (Texas Land Trust), to drill two 8,000-ft. tests, one on the S½ N½ of Section 7, Block 46, a mile southwest of the discovery well, the other on the 163.6 acres in the lease consisting of E½ N¼ and N½ SE¼ of Section 19, Block 45, about 1¼ miles south of the discovery. Reported consideration for the two tracts was $100 per acre cash, $3,500 per acre out of oil, plus the drilling obligations.

In the Wheller-Ellen pool, Winkler County, and about 2 miles southwest of the lease tracts mentioned above, Tide Water Associated Oil Co. 1 Wheeler has been completed from perforations at 10,635-680 ft. flowing 1,774 bbl. oil daily, gas-oil ratio 1,085 to 1, oil 45.6°-gravity, through ½-in. tubing choke.

Sinclair Prairie Oil Co. is reported to have staked 1 W. L. Johnson as an 8,000-ft. wildcat in southwestern Gaines Coun-

DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 21 crude oil	Distillate, allied products	October PAW quota all oils	Oct. 14 crude oil
Arkansas	80,650	4,500	83,000	80,800
California	892,450	51,100	937,300	892,500
Colorado	9,300	.....	8,500	9,100
Eastern	68,500	6,100	80,200	67,000
Illinois	190,700	11,500	217,100	204,700
Indiana	12,600	.....	13,500	12,400
Kansas	295,650	4,300	280,000	287,900
Kentucky	28,600	2,500	27,800	24,800
Louisiana	362,600	35,000	385,000	363,200
North Louisiana	72,850	.....	.....	73,400
South Louisiana	289,750	.....	.....	289,800
Michigan	44,300	400	50,500	52,200
Mississippi	52,700	.....	46,000	45,800
Montana	24,000	200	22,300	23,950
Nebraska	950	.....	1,000	950
New Mexico	104,700	5,500	115,500	104,000
Oklahoma	343,350	27,000	366,800	345,250
Texas	2,133,350	138,000	2,278,000	2,133,400
East Texas	371,350	.....	.....	371,400
East Central Texas	149,500	.....	.....	149,550
North Central Texas	148,800	.....	.....	148,700
Texas Panhandle	98,800	.....	.....	98,850
West Texas	492,800	.....	.....	492,700
South Central (S. A.)	19,750	.....	.....	19,800
South Texas (Laredo)	77,800	.....	.....	77,900
Lower Gulf Coast	236,850	.....	.....	236,800
Upper Gulf Coast	537,700	.....	.....	537,650
Wyoming	95,600	3,000	98,300	93,700
Total United States	4,740,000	289,100	5,010,800	4,721,650
Change from previous week	up 18,350	.....	.....	.....

Total production January 1-October 21, 1944	1,337,650,800 bbl.
Same period last year	1,190,200,685 bbl.

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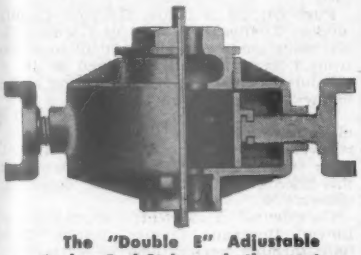

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ty, located in SW SE of Section 16, Block A-28, PSL Survey.

WEST TEXAS WILDCAT COMPLETIONS

Crockett County: Phillips 1 Wm. Schneeman, Sec. 46, Blk. BB, TCRR Co. Sur., 25 mi. NW Ozone, elev. 2,606 ft., Ellenburger 9,620 ft., dry, TD 9,916 ft.

Howard County: Skelly 1 W. L. Wilson, Sec. 16, Blk. 27, H&TC Sur., 15 mi. NW Coahoma, elev. 2,504 ft., dry, TD 4,742 ft.

Loving County: Standard of Texas 1-22 L. C. Link, Sec. 22, T-2 Blk. 55, T&P Sur., 15 mi. NW Menton, elev. 2,889 ft., dry, TD 4,060 ft.

Lynn County: Texas 1 R. V. Tunnell, Sec. 451, Blk. 1, EL&RR Sur., 6 mi. SE Tohoka, elev. 3,032 ft., dry, TD 6,690 ft.

Pecos County: Humble 1-C O. W. Williams, Sec. 19, Blk. 119, GC&SF Sur., elev. 2,827, Yates 2,735 ft., top pay 2,770 ft., PB to 2,896 ft., flowed 4 bbl. day, gravity 35.6°, TD 3,002 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Gulf Oil Corp. 1 Vivian, new lower Permian strike in 30-22-38, eastern Lea County, bottomed at 6,508 ft., perforated casing at 6,430-60 ft. in the lower part of the pay section, treated with 2,000 gal. of acid and after swabbing dry, filled 1,200 ft. with oil in 2½ hours, showing no water. Operators were preparing to perforate casing opposite the rest of the pay zone, from 6,375-6,430 ft. Seeking to broaden this new area, Gulf staked 1 State, in NW NE 32-22-38, 1¾ miles southeast of the discovery, and 1 Max Gutman, SE SW 19-22-38, a north offset to the discovery. In the southeastern corner of the county, Humble Oil & Refining Co. 1 Federal-Leonard Oil Co., new and deepest Permian basin discovery, was drilling out cement after setting 5½-in. casing at 11,963 ft., total depth 11,969 ft., and will perforate casing to complete. Continental Oil Co. 2-B-23 Skaggs, deep wildcat east of Monument, was drilling below 10,327 ft. in green shale and lime, apparently still in the Simpson.

TEXAS PANHANDLE

AMARILLO.—Stanolind Oil & Gas Co. 1 W. J. Lewis is a new wildcat location, contracted to 7,500 ft., in SW NE Section 81, Block E, D.&P.R.R. Survey.

PANHANDLE WILDCAT COMPLETIONS

Oldham County: Stanolind 1 C. T. and W. T. Herring, Sec. H, Blk. 3, League 307, 13 mi. NE Vega, elev. 3,594 ft., Cimarron anhydrite 2,850 ft., Cisco 4,420 ft., dry, TD 7,279 ft.

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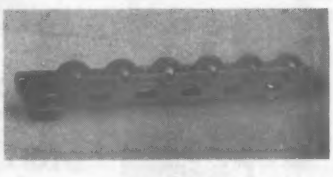

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10-DU-6

N. CENTRAL TEXAS

Wilbarger Discovery Completed Flowing 105 Bbl.

WICHITA FALLS.—Fain & McGaha Oil Corp. 1 G. K. Martin, new Palo Pinto lime discovery in Section 5, Block 11, H&TCRR Survey, Wilbarger County, was completed flowing 105 bbl. oil in 10 hours through 20/64-in. choke, gas-oil ratio 421 to 1, gravity 39.8°, from lime pay at 4,776-4,803 ft.

Pure Oil Co. 1 Little, Grayson County wildcat 2 miles southwest of Gordonville, last week made a 30-minute drill-stem test from 7,445-69 ft. and recovered 90 ft. of oil-and-gas-cut mud. It was drilling ahead below 7,370 ft. in sand and shale.

Continental Oil Co. 1 Welch, wildcat 2 miles northwest of Newport, Clay County, recovered 100 ft. of salt water on a drill-stem test at 6,765-6,806 ft., total depth, in the Ellenburger and was shut down for orders.

Continental 1 McNutt, southwest of Bowie, Montague County, testing Viola lime through perforations at 6,715-35 ft., flowed 22 bbl. oil in 1½ hours through casing, then ran tubing and tested 107 bbl. of oil and 22 bbl. of water in 12 hours, flowing and swabbing. Stanolind Oil & Gas Co. 1 Gossett, slightly farther southwest, was shut down for repairs at 5,486 ft.

In Jack County, Continental 1 Risch, in Section 13, Block 2, Henderson CSL Survey, was showing chiefly gas as it continued testing through perforations at 4,947-71 ft. and 4,959-68 ft. and during last 24-hour period made 6,850,000 cu. ft. of gas, 12 bbl. of oil and 4 bbl. of mud.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: D. H. Bolin 1 A. J. White, Blk. 111, J. W. Harris subd., 4 mi. W and 1 mi. N Archer City, elev. 992 ft., dry, TD 1,425 ft.

Clay County: Continental 1 E. W. Reynolds Est., Lot 14, Marion CSL, A-308, elev. 956 ft., Simpson 5,834 ft., Ellenburger 5,950 ft., dry, TD 6,059 ft.

Cooke County: Texas 1 W. Lynch, Sec. 6, Lot 3, Univ. League No. 7, J. W. Blankenship Sur., A-1332, 6 mi. E and 3 mi. N Gainesville, elev. 772 ft., dry, TD 5,670 ft.

King County: Shamrock Oil & Gas et al 1 R. B. Masterson, Sec. 20, J. R. Johnson Sur., 10 mi. NE Guthrie, Ellenburger 6,810 ft., dry, TD 6,826 ft.

Montague County: Gulf 1-E W. T. Ferguson et al, W. Watson Sur., A-836, 1 mi. S and W Belcherville, elev. 895 ft., Simpson 5,864 ft., Ellenburger 5,974 ft., dry, TD 6,125 ft.

WEST CENTRAL TEXAS

ABILENE.—Cherry & Kidd, F. R. Jackson et al 1 Wood, located 1,500 ft. east of an old producer in the Beddo pool, Runnels County, was reported flowing 12 bbl. oil per hour from the Palo Pinto lime pay at 3,546-60 ft., total depth. It is

1,500 ft. from south, 330 ft. from west lines of Subdivision 27, D. Diaz Survey No. 532.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Fisher County: Northern Ordnance 1 L. Kolb, Sec. 181, Blk. 2, H&TC Sur., 5½ mi. NE Rotan, elev. 1,896 ft., Strawn 5,615 ft., dry, TD 5,742 ft.

Shackelford County: Hedrick Oil 1 J. H. Nail Est., Sec. 92, ETRR Sur., 7 mi. NW Albany, elev. 1,834 ft., dry, TD 1,694 ft.

Stephens County: L. H. Choate 1 J. H. Garner et al, Sec. 83, Blk. 6, T&P Sur., 14 mi. SE Breckenridge, dry, TD 2,008 ft.

SOUTHWEST TEXAS

Atlantic's Loma Alta Deep Sand Test Coring Ahead

CORPUS CHRISTI. — Atlantic Refining Co. 1 Sam Atkinson, ½ mile west of deep-sand production at Loma Alta field, McMullen County, cleaned up fishing job at 7,250 ft. and is coring ahead. This test showed for an oil well on drill-stem test at 6,896-6,902 ft., where it flowed pipeline oil, recovering 3,700 ft. of oil and 200 ft. of brackish mud and drill fluid.

H. R. Smith and W. C. McBride, Inc., 1 W. C. McCaskill, Jr., wildcat in the Porter area, Karnes County, is shut down for orders with total depth 8,650 ft. This test has picked up several shows. It showed gas in the 7,400-ft. level, then recovered oil and salt water at 7,425-35 ft.; had sand with gas and condensate show at 7,636-54 ft. and salt water sand at 7,740-56 ft.

Transwestern Oil Co. 1 Nettie Green, west extension to Slick field in DeWitt County, flowed a potential of 221 bbl. daily on 5/32-in. choke, gas-oil ratio 742 to 1, tubing pressure 1,035 lb., casing pressure 1,250 lb., gravity 35.3°, no water, perforations, 23 holes at 7,627-32 ft., and 23 holes at 7,638-43 ft., total depth 7,654 ft., 5½-in. casing on bottom.

Humble Oil & Refining Co. 1 A. M. Lockwood, southwest of discovery well at Charlotte field in Atascosa County, which has been in the process of testing for a couple of weeks, has thus far failed to produce satisfactorily. It was first tested at 6,892-97 ft., then drilled out to 6,900 ft., acidized and flowed into burning pits on ¼-in. choke, tubing pressure 75-260 lb., 5 to 49 per cent oil but went dead. Total depth is 6,919 ft., with 5½-in. casing set on bottom.

Humble completed another producer at the Imogene field in Atascosa County. The new well is 1 Moore & Bernard, total depth 7,594 ft., 5½-in. casing set at 7,588 ft., 2-in. at 7,591 ft., flowed potential of 96.3 bbl. per day on ¾-in. choke, tubing pressure 475 lb., gas-oil ratio 486 to 1, 0.1 per cent water.

Magnolia Petroleum Co. 1 W. E. Erp, wildcat 9 miles west of Pettus, in Bee County, ran first production test in perforations 6,965-77 ft., flowed at 365 lb. pressure, making 50 per cent oil and 50 per cent water. Perforations were squeezed and it is waiting on cement to set. Total depth is 7,600 ft. with 7-in. set at 7,150 ft.

Magnolia 2 Ingram, Burnell-Wilcox area, Bee County, is cleaning from the 6,770-ft. sand showing tubing pressure of 200 lb., casing pressure 2,000 lb., no gage yet. Total depth 6,772 ft., 7-in. casing set at 6,770 ft. Drill-stem test, before setting casing, at 6,770-72 ft., had yielded gas-condensate, 375 lb. working pressure, 20 minutes, and a test at 6,768-70 ft. had shown gas.

Magnolia 1 State-Marshall, Kelsey field, Brooks County, originally completed in

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1941 as a gas well in perforations at 4,707-10 ft. is now recompleted as an oil well at the same level. It gaged 78.38 bbl. per day on ¼-in. choke, gas-oil ratio 24,500 to 1, tubing pressure 1,100 lb., casing pressure 1,500 lb., gravity 45°, no water. Total depth is 4,775 ft., with 5½-in. casing set on bottom, and 2-in. at 4,700 ft.

A. M. Lacey 1 Carlos Vela et al, 4 miles northeast of Lopeno, Zapata County, is dry at total depth 4,210 ft. It had picked up a sand with gas show at 2,280-2,310 ft. and small show of oil at 2,414-40 ft., but was nonproductive.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Bee County: Slick Oil Co. 1 J. E. Copeland, South Caesar area, Obid Marshall Sur., Abstract 235, dry at 7,360 ft.

Duval County: J. W. Gorman 2 A. Herbst, H&GN Sur. 9, 9 mi. E of Freer, TD 2,980 ft., PB 2,840 ft., perforated 10 holes 2,832-34 ft., PT 43.2 bbl. net oil day pumping, gravity 23, 60 per cent water. Herbst discovery.

Duval County: J. W. Gorman and Bridwell Oil Co. 1 M. V. Ruiz, Sur. 44, 9½ mi. SE of Freer, dry at 3,662 ft.

LaSalle County: Sohio Oil Co. 1-B Callaghan Land & Pastoral Co., 15 mi. E of Encinal, in W. F. Sparks Sur. 127, dry at 6,211 ft.

Live Oak County: Magnolia Petroleum Co. 1 C. K. Maley, Thos. B. Reese Sur., 7 mi. NE of Oakville, dry at 7,160 ft.

Live Oak County: Moore Development Co. 2 Clara Briam, Dennis McGowen Sur., 2 mi. S of Oakville, dry at 8,006 ft.

Maverick County: Texas Gas & Utilities Co. 1 Hal Mangum, I&GN Sur., Block 7, 25 mi. N of Eagle Pass, dry at 5,218 ft.

Webb County: Adams & Lyles 1 Prudencia de La Garza, Sur. 675, 8 mi. N of Bruni, dry at 2,415 ft.

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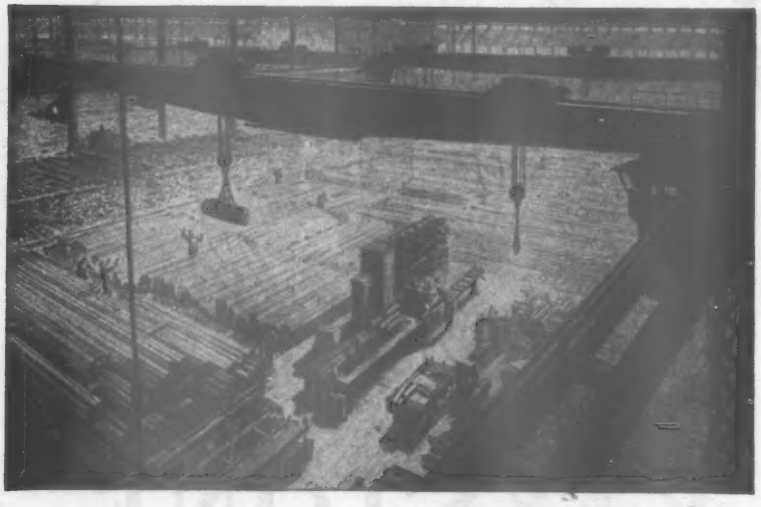

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SOUTH LOUISIANA

Union's Houma Area Wildcat a Gas Well

NEW ORLEANS.—Union Oil Co. of California 1 Gaidry, wildcat Houma area, 22-17s-17e, showed for a gas well in 23 perforations at 10,290-98 ft., total depth 12,618 ft., with 5½-in. casing at 10,350 ft. Well is still testing. Drill-stem test at this level, ¼-in. top and ¼-in. bottom chokes flowed dry gas, 1,000 lb. working pressure.

Humble Oil & Refining Co. 1 C. G. Robinson, 9-10s-13e, at Laurel Ridge field in Iberville Parish, is waiting on cement to set with 5½-in. casing set to bottom at total depth 10,710 ft. shale and sandy shale. Discovery well of this area, Humble 1 Adam Hymel et al, same section, was completed in perforations at 10,688-10,705 ft. in July, flowing 113 bbl. per day of 49.5° gravity condensate through ¼-in. choke, gas-oil ratio 50,000 to 1, no water, tubing pressure 3,100 lb., flowing and 3,450 lb. shut in.

Sun Oil Co. 1 Blanchard Pool, 43-17s-16e, wildcat in Humphreys prospect, Terrebonne Parish, is drilling at 9,853 ft. in shale.

Humble 1-F Miami Corp., wildcat Black Crook Bayou area, in West Cote Blanche Bay, St. Mary Parish, is drilling 10,400 ft. shale and sand.

SOUTH LOUISIANA WILDCAT COMPLETIONS

Ascension Parish: Robert Y. Walker and Calapor Manufacturing Co. 1 Realty Operators, Burnside area, 1-11s-3e, dry at 11,227 ft.

Jefferson Davis Parish: Continental Oil Co. 1 King Corp., discovery Bayou Serpent, 30-7s-6w, TD 9,302 ft., perforations 7,135-45 ft., Ortego sand, PT 178 bbl. day 6/64-in. choke, gas-oil ratio 672 to 1, TP 1,025 lb., casing sealed, gravity 35.7°, water 0.2 per cent.

APPALACHIAN FIELD

South Penn Announces Further Sales Reduction

PITTSBURGH. — Reflecting dwindling production and exhausted crude stocks for November, South Penn Oil Co., largest producer and purchaser of Penna Grade crude, announced a further reduction in its sales to refineries to 70 per cent of the ratable.

In Butler County, Pennsylvania, Manufacturers Light & Heat Co. struck the first sustained volume of gas in the deep test on J. G. Hockenberry farm in Mercer Township, with a showing of 23,000 cu. ft. gas in the St. Peter at 9,740 ft. It is now drilling at 9,797 ft.

In Fayette County, New Penn Development Co. is drilling at 5,760 ft. in the test on Thompson lease, east of the cross roads in Wharton Township, and at that depth there is a showing of brown shale.

In Hancock County, West Virginia, Smith Petroleum Co. topped the Oriskany sand at 4,991 ft. in the test on C. A. Smith farm in Clay district, but at 4,995 ft. salt water was developed. The salt water is being shut off with a plug in the Onondaga chert, topped at 4,765 ft., and the shales may be shot.

In Preston County, Wm. E. Snee et al struck a small volume of gas in the "B" member of the Oriskany sand in the test on Harry Sisler farm in Portland district. The top of the Oriskany was placed at 5,845 ft. with about 12,000 cu. ft. gas showing at 5,952 ft. and it is drilling at

5,956 ft. Further study of the samples of the Marcellus section shows some slickenside and shale distortion which tends to the belief that it crossed a fault and may be ending on the downthrow side as much as 200 to 300 ft.

In Lincoln County, United Fuel Gas completed a Big lime gas well gaging 1,100,000 cu. ft. gas at 5,461 Huntington Development Gas Co., Laurel district, with total depth of 1,690 ft.

CALIFORNIA

Standard's Deep Test Reaches 15,389 Ft.

LOS ANGELES.—Of interest this week in view of the projected natural-gas transmission line from Hugoton to California was the completion of Pacific Lighting Corp.'s 1 Miller in the Goleta gas field of Santa Barbara County flowing 145,400,000 cu. ft. of dry gas daily from a depth of 4,510 ft. This represents the well's maximum flow through casing while the hole was being cleaned out preparatory to completion and it will not be produced at this rate. Pressure draw down of only about 300 lb. was recorded during the flow test. During the flow test the pressure was recorded as 1,440 lb. and shut-in pressure has been gaged at 1,750 lb. Cores indicate a very high permeability at Goleta.

Pacific Lighting Corp. purchased fee title to this field several years ago and has been utilizing it as a balancing factor between supply and demand. Gas is injected during the summer months of low demand for gas and produced during the winter months of peak requirements. The current completion did not extend the limits of the field as it is one of several projected wells to be drilled at Goleta.

Development work is continuing in the Elk Hills field and a check made a few days ago indicates the probable completion of 13 new wells within the next 2 weeks. At Buena Vista Hills, where Standard Oil Co. of California proved up the existence of a deeper Pliocene sand several months ago, there has been a slight tapering off in recent weeks due to inability to secure drilling crews.

In Southern California, development work continues at Huntington Beach where operators are consistently exploiting the Jones sand of Pliocene age, and at Wilmington where the Ranger and Terminal zones are undergoing development. Wilmington operators have been feeling the pinch resulting from an inadequate number of drilling crews with the result there are many locations staked for work and locations standing with foundations in. Production of this field has shown an increasing tendency during the past several weeks. At Torrance development work has declined somewhat due to the limited amount of acreage open for drilling. Several large completions have been registered in the Redondo section of the field but restrictions against drilling have prevented expansion of the highly productive area. Seal Beach, on the other hand, is showing increased activity due to extension of the productive area north of the Seal Beach fault, long considered as marking the outer limits of production. Last week, Standard developed large production in 29 San Gabriel in the first Selover sand north of the fault and this completion probably proves up several additional Selover zone locations for Standard and Continental Oil Co.

Standard's depth record-breaking test in the South Coles Levee field of Kern County has reached a depth of 15,389 ft. and is still drilling ahead. The formation has loosened up somewhat after several weeks when 15 ft. a week was recorded as good progress.

CALIFORNIA WILDCAT COMPLETIONS

Cantil wildcat district, Kern County. J & S. Exploration Co. 2 Crookshank, 19-30s-38e, dry in hard gray sand, no showings, TD 1,100 ft.

Olive wildcat district, Orange County: Richfield 1 Hamrick, 8-4s-9w, dry in gray sand, no showings recorded. TD 2,679 ft.

Oroville wildcat district, Buttes County: Pacific Western and George F. Getty 1 Greenlee, 25-19n-2e, dry in basement material, no showings logged, TD 3,491 ft.

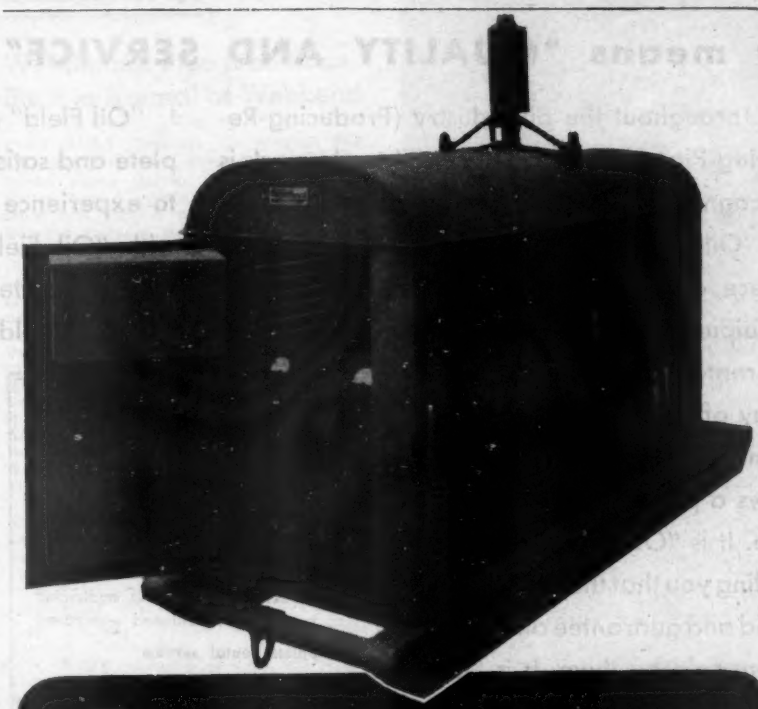
San Gregorio wildcat district, San Mateo County: Richfield 1 Lena Souza, 13-7s-5w, dry in hard sand, no showings of gas or oil, TD 5,211 ft.

Shafter wildcat district, Kern County: Tide Water Associated 86-7-A Shafter Comm., 7-28s-25e, dry, top Rio Bravo sand 12,296 ft., top Vedder sand 12,512 ft., both zones too tight to produce, 7⅝-in. casing cemented, 11,094 ft., cut and recovered from 3,765 ft., TD 12,618 ft., both Rio Bravo and Vedder contained a little oil.

MICHIGAN

Sun's Tuscola Wildcat Completed as Dry Hole

SAGINAW.—Sun Oil Co., wildcatting in Michigan's Thumb section has started out unsuccessfully with completion of 1 Wordan, in Novesta Township, Tuscola



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County, as a dry hole after drilling to a depth of 4,194 ft. That failure was one of five dry wildcat tests completed in the past week which resulted in 17 completions in Michigan for a net result of 4 oil producers, 2 gas wells and 11 dry holes. Best producer was the Sun 3 Church in Fork Township, Mecosta County, which flowed 378 bbl. pinched the first 14 hours.

Michigan crude production again is below 50,000 bbl. a day, Michigan Oil & Gas Association figures indicate. The September estimate was 48,243 bbl. for 1,447,000 bbl. in the month from 3,376 producing wells. The Reed City field, with 186 wells, still producing nearly 30 per cent of the Michigan total, remained practically stationary while all other principal pools showed declines.

Ten new drilling permits were approved by the state conservation department to bring the 1944 total to 572. Locations are two each in Bay, Isabella and Osceola counties, one each in Allegan, Gratiot, Montcalm and Missaukee.

MICHIGAN WILDCAT COMPLETIONS

Isabella County, Rolland Township: Carter Oil Co. 1 Arthur J. Fisk, NE NW SE 4-13n-6w, dry, TD 1,337 ft.

Union Township: Sohio Petroleum Co. 1 Cora E. Cole, C S½ SE NW 34-14n-4w, dry, TD 1,535 ft.

Kent County, Solon Township: Neil Wagenaer 1 Mrs. J. Lawrence, SE NE NE 30-10n-11w, dry in Dundee, TD 2,934 ft.

Tuscola County, Novesta Township: Shell Oil Co., Inc. 1 Frank Wordan, NW NW NW 16-3n-11w, dry, TD 4,194 ft.

Van Buren County, Paw Paw Township: W. H. Clock 1 Gannet, Sw frl. NW 19-3s-14w, dry in Traverse limestone, TD 1,102 ft.

TEXAS GULF COAST

Humble's Livingston Test Flows 259-Bbl. Potential

HOUSTON.—Humble Oil & Refining Co. 2 Sodak Oil Co., second Sparta sand producer in north part of the old Livingston field in Polk County, flowed a potential of 259.72 bbl. daily on ¼-in. choke, tubing pressure 460 lb., gravity 38.1°, 0.5 per cent water, gas-oil ratio 690 to 1, from perforations at 6,120-30 ft. in sand topped at 6,120 ft. Total depth is 6,200 ft., plugged back to 6,132 ft., 5½-in. casing set on bottom. This well is 1,781 ft. north of the 1 Sodak, also a Sparta producer.

Cities Service Oil Co. 1 Winnie Poole, at Ramsey, Colorado County, testing in new perforations 8,870-77 ft., flowed at the rate of 2,611,000 cu. ft. gas, 74.1 bbl. of 55.2° gravity distillate and 7.4 bbl. of wash water daily on ¼-in. choke, tubing pressure 2,050-2,150 lb. More perforations will be made from 8,850 to 8,870 ft. for a test of the entire section.

Texmass Oil Corp. 1 E. G. Siadous, northwest side of Mykawa field, Harris County, flowed at the rate of 100 bbl. per day on ⅛-in. choke of 32° gravity oil, from perforations 4,841-46 ft. Total depth is 5,204 ft. Operators are waiting on official potential gage. This company's 2 E. G. Siadous is located 200 ft. north and slightly east of the No. 1 well. It is a scheduled 5,500-ft. test.

ElTex, Ltd., 1 Mrs. Blanche Bender, northeast of the discovery well at Spring field, Harris County, is coring for the Cockfield discovery sand which produces in the discovery well through perforations at 6,243-47 ft.

Houston Oil Co. of Texas and American Republics Corp. 1 Hardin-fee, wildcat 5 miles south of Warren, in Hardin County, is drilling at 6,175 ft. in hard sandy shale. This well recovered some distillate on test at 5,799-5,808 ft.

General Crude Oil Co. 2-B Welch-fee, at Kirby field, Liberty County, originally abandoned in 1942 at total depth 9,976 ft., was reworked and completed as an oil producer, top sand 7,685 ft., total depth 7,805 ft., perforated 420 holes from 7,695-7,765 ft., flowed potential of 151.50 bbl. per day ¼-in. choke, gas-oil ratio 1,155 to 1, tubing pressure 275 lb., gravity 38.2, 0.2 per cent water.

Magnolia Petroleum Co. 1 Herman Lauter, on flank of old Clay Creek dome, Washington County, is testing on pump. No gage is available but test is showing for a small well. Perforations are at 4,606-11 ft., 35° gravity oil, total depth 8,022 ft.

OKLAHOMA

W. Edmond Pipe Line Runs Back to Normal at Weekend

SATURDAY morning, the seventh day after the fire that destroyed the Banks pump station of the Cimmaron Valley Pipe Line Co., temporary equipment was moving oil out of the West Edmond field at the rate of 40,000 bbl. per day, a rate higher than the prefire record. Rapid replacement of damaged equipment resulted in pipe-line runs averaging 28,450 bbl. per day from 184 connected wells, a decrease of only 3,150 bbl. from the previous week. At the end of the week there were 199 Hunton producers, 4 Bartlesville oil producers and 1 Bartlesville gas well. Active tests totaled 106 in addition to 79 locations announced, including 42 locations on which derricks had been erected. Eleven dry holes have been drilled in defining the edges of the field, none of which definitely limit it on either the north or the south.

In McClain County, Carter Oil Co. 1 N. R. Johnson, Wilcox discovery in SW SE 30-8n-2w, after considerable testing and trouble with shutting off water, flowed 368 bbl. of oil in 24 hours with very little water from 8,190-8,200 ft., after perforating with 14 shots.

In the old Graham pool of Carter County, Continental Oil Co. 1 Fowler, NW SE SW 31-2s-2w, a deep test which reached a total depth of 8,249 ft., and backed up testing various possibilities, flowed 100 bbl. of oil per hour from the Chimney Hill section of the Hunton lime at 5,410-44 ft., after acidizing with 3,000 gal. During testing of deeper horizons, the Viola lime was tested at 7,022-32 ft., and 6,894-6,901 ft., and swabbed about 50 bbl. per day.

OKLAHOMA WILDCAT COMPLETIONS

Lincoln County: Sinclair Prairie 1 Danker, SE NW SE 28-14n-3e, flowed 138 bbl. of 55.2° gravity oil from pay zone 3,475-98 ft., TD 5,246 ft., Cleveland 3,475 ft., Prue 4,161 ft., Wilcox 5,165 ft., second Wilcox 5,231 ft.

Logan County: Eason Oil 1 Michael, SW SW N W12-17n-4w, flowed 90 bbl. distillate and 3,500,000 cu. ft. gas from pay zone 4,902-29 ft., TD 4,967 ft., Layton 4,910 ft.

Oklahoma County: Magnolia 1 Talbot, NW NW 28-13n-4w, West Edmond extension, flowed 103 bbl. oil in 1 hour and 3,000,000 cu. ft. gas from pay zone 6,970-7,058 ft., TD 7,109 ft., Bois d'Arc 6,945-7,059 ft.

Pontotoc County: Leland Cooper et al 1 Jacquess, SW NW SE 34-4n-5e, dry, TD 1,860 ft., Cromwell 1,093 ft.

Seminole County: Deep Rock et al 1 Jackson, NW NE NW 21-7n-7e, dry, TD 4,453 ft., Wilcox 4,448 ft.

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ROCKY MOUNTAIN

Embar Discovery Opens New Pool in Wyoming

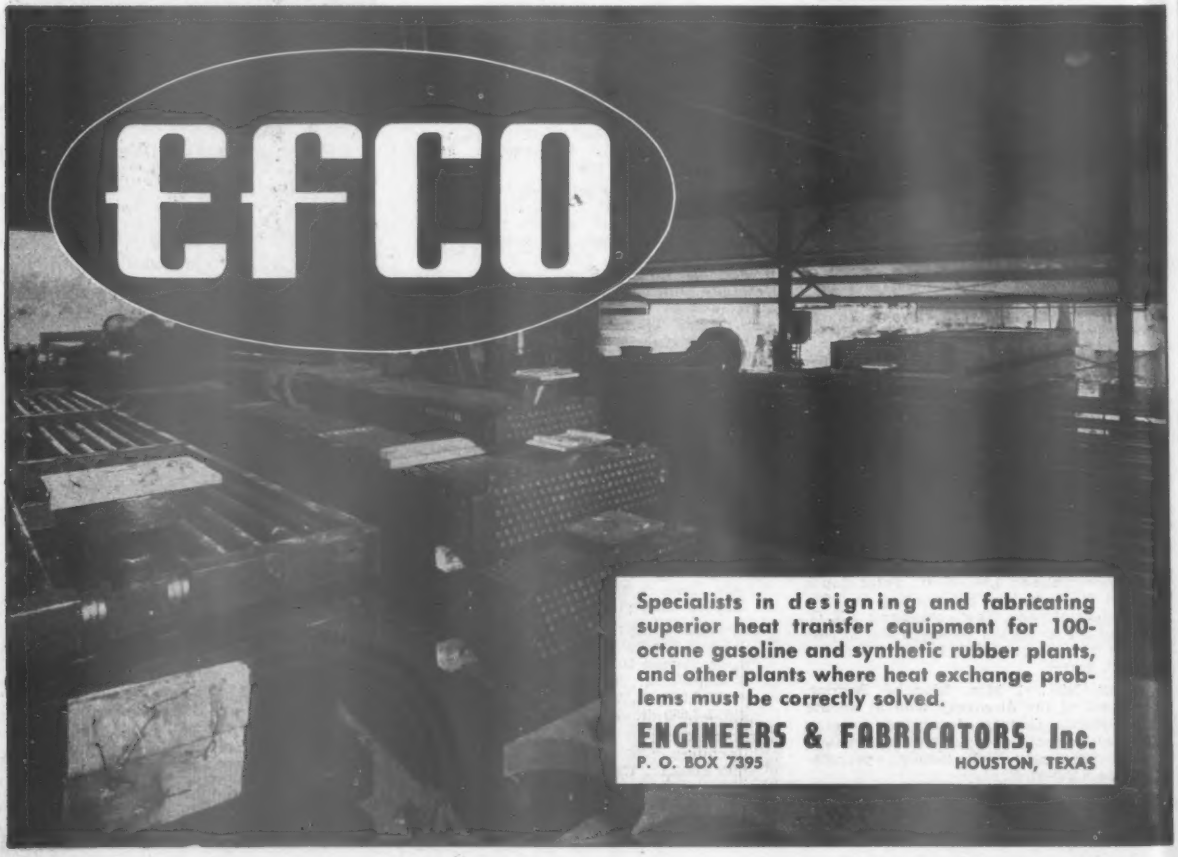
DENVER.—A major oil discovery is imminent on the Big Sand Draw structure in Fremont County, Wyoming, a field which has produced gas from upper formations since 1918, in Sinclair-Wyoming Oil Co. 1 Unit, SW NW NW 14-32n-95w. The test topped the Embar at 6,896 ft., and 1 ft. in the sand showed saturation. The core barrel then was run and the hole deepened to 6,913 ft., where it was stopped to make a drill-stem test. The test, at 6,896-6,913 ft., open 57 minutes, showed 1,560 ft. of oil and 633 ft. of oil-cut mud with 90,000 cu. ft. of gas. One of the important factors is that crude is sweet with a gravity of 32.5°, and more like the crude in the Carbon County fields to the southeast than the heavy oils in those to the north. The well is located near the top of the structure and ½ mile from one of the big gas wells completed back in 1928 in the Frontier at 2,917 ft. for 50,000,000 cu. ft. a day.

Big Sand Draw is in the Wind River basin which is separated from the Big Horn basin on the north by the Owl Creek mountain range. Currently the field has 14 gas wells with an approximate capacity of 200,000,000 cu. ft. a day from the Frontier horizon, the deepest test having been drilled to the Morrison. The gas is piped to Casper and eastern Wyoming and western Nebraska cities and towns. The structure has a proven closure of 1,300 ft. A unit agreement for the testing and development of the Tensleep horizon was approved by the Secretary of the Interior last spring with the Sinclair-Wyoming Oil Co. as the operator. There are approximately 2,000 acres within the unit, the larger part of which is held by Sinclair-Wyoming. Other holders of interests are Fremont Petroleum Co. (Stoddard estate), Unit Oil Co. (R. S. Shannon interests) and Warwick M. Downing and H. C. Bretschneider. The Embar lies above the Tensleep, the objective in this well. The discovery opens attractive possibilities in the Muskrat gas field, 18 miles northeast, Beaver Creek, 10 miles to the northwest where Stanolind had a gas discovery in the Morrison at 8,500 ft. in 1938, and the Alkali Butte structure, 10 miles to the north, none of which have been drilled to Embar or Tensleep. Five major wildcats are now drilling in Fremont County. Winkelman, Steamboat Butte and Pilot Butte are the most recent discoveries in the county.

Tensleep well at Frannie.—Continental Oil Co. has a discovery in the Tensleep south of the south fault in the Frannie field, Park County, Wyoming, in 2-F Mau, SE NW SW 25-58n-98w, which swabbed 10 bbl. an hour through perforations at 2,919-49 ft. This fault runs northeast-southwest through the center of Section 25. Tensleep producers lie to the north of the fault. Last year Continental drilled in SE NE SW of Section 25, found water in the Tensleep and completed it as a producer in the Madison. Then it moved ⅛ of a mile east and had water in both horizons. The third well, ¼ mile west of the Madison sand producer, was then drilled with results noted above.

Bell Rock test.—Stanolind Oil & Gas Co. 1 Hanewalt, Bell Rock, Moffat County, Colorado, joint operation with Continental and Ohio Oil Co., is drilling and coring in very hard dry sand, believed to be the Sun[illegible]ance, at 8,895 ft.

Atlantic takes big block.—Atlantic Re-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fining Co. filed application with the Wyoming state land board for leases on 21,102 acres of state land directly south of the Lance Creek field and north of Manville in Niobrara County, Wyoming, a record for state leases. Fees amounted to $5,770.

WYOMING WILDCAT COMPLETIONS

Park County, Frannie: Continental 2-F Mau, SE NW SW 25-58n-98w, TD 2,952 ft., 7-in. 2,951 ft., perf. 2,919-49 ft., swabbed 10 bbl. per hour from Tensleep, top Tensleep 2,918 ft., first Tensleep producer south of south fault.

MONTANA WILDCAT COMPLETIONS

Choteau County, Ashmoor Block: Texas 1 Shepard, NE SW SW 22-27n-3e, TD 2,068½ ft., Ellis-Madison 2,058 ft., sulfur water, dry.

Pondera County, Conrad-Midway: R. C. Tarrant 1 Gehrig, NW SW SE 31-28n-1w, TD 1,720 ft., dry.

KANSAS

Black Oil Show in Sun City District, Barber County

CHAMPLIN REFINING CO. 1 Oldfather, SE NW NE 18-31-14w, has apparently discovered a black oil pool in the Sun City gas district of Barber County, ½ mile west of a gas well. A 1-hour drillstem test in the Maquoketa at 4,407-45 ft. recovered 3,400 ft. of black oil, gas, and 350 ft. of salt water. Reported tops are Lansing 3,792 ft., Marmaton 4,277 ft., Sooy Conglomerate 4,325 ft., Kinderhook 4,343 ft., Viola 4,437 ft., and Maquoketa 4,407 ft.

Ellis County.—Skelly Oil Co. 1 DeHoff, NW SW NE 30-11-16w, a wildcat east of the South Bemis pool, has been given a potential of 81 bbl. per day from Arbuckle pay at 3,343-46 ft. This test also had a light show in the Simpson. Tops reported are Lansing 3,021 ft., Simpson 3,329 ft., and Arbuckle 3,343 ft.

Graham County.—Skelly may also have a small well in its 1 Davis, a wildcat in the northeast part of the county at NW NW NW 15-7-22w. It swabbed a few gallons of heavy, black oil from the Arbuckle, topped at 3,841 ft., and is now being acidized. Other tops reported are cherty conglomerate at 3,837 ft. and Lansing at 3,522 ft.

New locations lagged this week with only 25 first reports, including 7 wildcats. Wildcats are scattered through central and western Kansas with 1 each located in Barber, Ellis, Lane, Norton, Pratt, Russell and Trego counties.

KANSAS WILDCAT COMPLETIONS

Barton County: C. E. Ash 1 Donovan "A," NW NW SE 36-17s-13w, dry, TD 3,376 ft., Arbuckle 3,355 ft.

Butler County: Adair & Morton 1 Hobson, SW SW NE 1-26s-6e, dry, TD 2,850 ft., Kansas City 1,765 ft., Mississippi lime 2,755 ft.

Ellis County: Sunray 1 Younger "B," SE SE NE 6-14s-17w, pumped 50 bbl. oil from pay zone 3,538-83 ft., TD 3,583 ft., Kansas City 3,285 ft., Arbuckle 3,523 ft.

Sunray 1 Schnider, SE SE SW 32-15s-19w, dry, TD 3,701 ft., Reagan 3,681 ft.

Gove County: Texas 1 Federal Farm Mortgage, NW NE SE 17-12s-30w, dry, TD 4,902 ft., Arbuckle 4,810 ft.

Hodgeman County: Continental 1 Gleason, SE NE NW 5-24s-21w, dry, TD 5,085 ft., Arbuckle 4,971 ft.

McPherson County: Deep Rock 1 Miller, NE NW SW 26-18s-2w, dry, TD 2,996 ft., Mississippi lime 2,931 ft.

Phillips County: Derby et al 1 Beckman, SW SW SE 36-3s-19w, dry, TD 3,670 ft., Arbuckle 3,631 ft.

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Sedgwick County: Paul Eckland 1 Stitt, SW SE NE 21-27s-1w, dry, TD 3,860 ft., Kansas City 2,687 ft.
Stafford County: Plains Exploration 1 Brinkman, NW NW NE 24-23s-12w, dry, TD 3,784 ft., Arbuckle 3,756 ft.

FOREST CITY BASIN

Francis 1 fee (inside town limits of Parkville) and Rupert 1 fee SE NE NW 22-51n-34w, in Platte County, Missouri, both completed as small gas wells, making 40,000 cu. ft. and 92,000 cu. ft., respectively. Francis 1 fee produced from black shale at 360-67 ft. and Rupert 1 fee from Knobtown sand at 255-62 ft.

MISSISSIPPI

Lamar County Test Cores 112 Ft. Saturated Massive

JACKSON.—Gulf Refining Co. 1 Cooper, NE NW 7-1n-16w, in Lamar County, has cored the main section of the Massive sand from 8,723-8,835 ft., and found it saturated with dark brown oil. A 12-minute drill-stem test at 8,725-35 ft. recovered 3,000 ft. of heavy black oil. Gravity of oil recovered on drill-stem test at 8,687-99 ft. was 18.5°, instead of 34° gravity as previously reported. The hole is being reamed to 8,835 ft. before coring any further.

MISSISSIPPI WILDCAT COMPLETIONS

Lauderdale County: Rogers Lacy 1 Shelburne, approx. NE NW NE 36-7n-17e, dry, TD 4,844 ft.

GEORGIA WILDCAT COMPLETIONS

Echols County: Hunt 1 Superior Pine & Products, 544 ft. S, 100 ft. W of Land Lot 364, Land Dist. 13, dry, TD 3,850 ft.

LA.-ARK.

Bossier Parish Test Also Gets Flow From "D" Sand

SHREVEPORT.—Barnsdall and Sohio Petroleum Co. 1 Hanks, SW NE 7-20n-12w, 14 miles west of the Cotton Valley field, which on previous tests flowed 125 bbl. per day of condensate at 8,114-48 ft. from the Bodcaw sand of the Cotton Valley formation, has tested the "D" sand above the Bodcaw at 8,001-40 ft., and got a flow of 210 bbl. of 61°-gravity condensate per day through a ¼-in. choke.

McAlester Fuel Co. 1 Wilson-McRae, SE SW 28-16s-18w, Union County, Arkansas, ½ mile north and ¾ mile east of the discovery well in the Salem-Church condensate pool, tested salt water from open hole bottomed in Smackover lime at 7,065-67 ft., below casing set at 7,065 ft. On previous drill-stem test at 6,947-7,050 ft., a recovery of 150 ft. of condensate with no water was recorded. After getting water at 7,065-67 ft., the well was plugged back and casing perforated at 7,026-34 ft. with 32 shots and further testing is proceeding.

NORTH LOUISIANA WILDCAT COMPLETIONS

Bossier Parish: O. F. Shaver 1 Broom, approx. NE NW NW 8-21n-13w, dry, TD 1,381 ft.
Grant Parish: H. H. Temple 2 Homer, 2,640 ft. S, 200 ft. E of NW frac. sec. 38-6n-2w, dry, TD 2,200 ft.
Morehouse Parish: Texas 1 Kimball, 1,980 ft. W, 660 ft. N, SE frac. sec. 3-23n-9e, dry, TD 5,034 ft.
Richland Parish: J. A. Humphreys 1 Sartor, SE SW SE 27-15n-6e, dry, TD 4,411 ft.

ARKANSAS WILDCAT COMPLETIONS

Columbia County: G. H. Vaughn 1 Bodcaw Oil, NW NE 14-18s-23w, dry, TD 9,255 ft.
Union County: J. R. Lockhart 1 Lockhart, approx. NE SW NW 32-16s-14w, dry, TD 5,868 ft.

OHIO, KENTUCKY

Third Recent Medina Sand Producer in Muskingum

COLUMBUS.—East Ohio Gas Co. completed its 1 E. J. Biery, Section 1, Bethlehem Township, Stark County, at 1,452,000 cu. ft. after shot. Pay sand was found at 4,533-61 ft. and gaged 724,000 cu. ft. natural.

The third recent Medina sand producer east of Philo was completed by B. G. Davis et al on Orval Maxwell, Section 32, Wayne Township, Muskingum County. Sand at 4,342-55 ft. was shot and made 40 bbl. first 24 hours and is now pumping 20 bbl.

Preston Oil Co. cored 14 ft. of sand in the 1 Wilbur Medkiff, Section 3, Bedford Township, Meigs County. A good showing of oil was found with 230,000 cu. ft. gas. The well will be reamed and shot.

OHIO WILDCAT COMPLETIONS

Lorain County, Rochester Township: Frank Brendel 1 Wayne Eaton, Lot 4, Clinton 2,295-96 ft., dry, TD 2,405 ft.

WESTERN KENTUCKY

OWENSBORO.—Twelve dry holes and 4 oil wells were reported completed in western Kentucky in the past week. One dry wildcat was reported in McLean County.

Roy F. Davis reports from Irvine, Ky., that he is moving in to start an Ordovician test 3 miles northwest of Irvine, in Estill County, southern Kentucky. The contract calls for a 2,100-ft. test. St. Peter sand is expected about 1,900 ft.

WESTERN KENTUCKY WILDCAT COMPLETION

McLean County: Ashland, Miller, Shiarella 1 Ora Frey, 3-M-29, dry at 2,232 ft., Chester 1,353 ft., Vienna 1,570 ft., Golconda 1,765 ft., Barlow 1,871 ft., McClosky 2,145 ft.

EASTERN KENTUCKY

ASHLAND.—One gas well, an oil well and a dry hole mark the report of operations in the Eastern Kentucky area during the past week. The gas well, according to reports from the field, was one of the largest to be drilled in this area and was gaged at 8,670,000 cu. ft. and was on the Utilities Elkhorn Coal Co. tract at Virgie in Pike County and is producing from Maxon sand at 1,493 ft.

Cardinal Oil Co. completed 4 Harris heirs on Ross Creek in Lee County at about 800 ft. with daily production of 8 bbl. of oil.

Kentucky West Virginia Gas Co. 5539 John W. Spears on Right Fork of Daniels Creek in Johnson County was a dry hole at 2,505 ft.

INDIANA

EVANSVILLE, Ind.—Three oil wells and two dry holes were reported completed in the past week in Indiana. All were field wells. Texas Co. 16-D Cooper, NW NE NW 13-3s-14w, was drilled to 2,502 ft. and failing at that depth was plugged back to 1,515 ft. and tested dry. Three wells averaging 50 bbl. initially were completed in Posey County.

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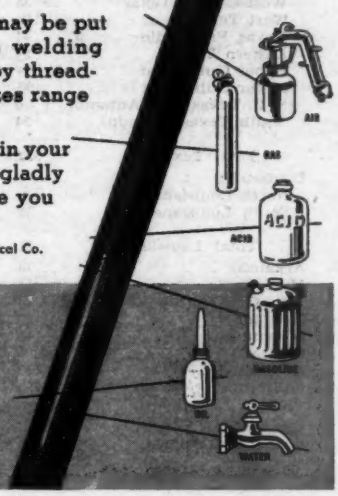

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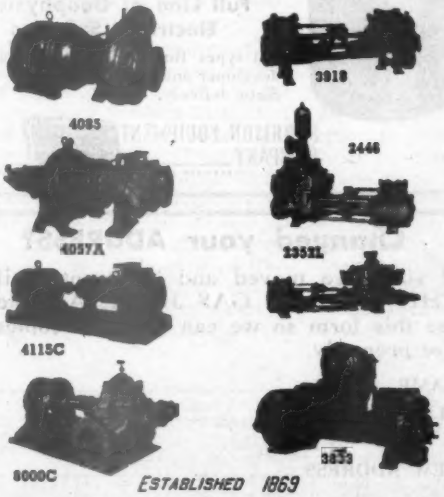

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Summary of September Completions

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
N. Y., Penna., W. Va.	560	260	380	86	†212	87	424	48	1	0	812,736	580
Ohio	93	12	222	43	38	9	26	57	1	0	257,308	110
Indiana	47	21	1,931	1	25	2	28	17	0	0	95,294	66
Kentucky	121	60	7,683	33	28	16	92	13	0	0	219,193	128
Michigan	87	42	9,847	11	34	2	45	39	1	0	203,384	150
Illinois	199	121	12,954	0	78	7	42	150	0	0	519,752	280
Kansas	191	86	45,949	12	93	0	17	172	2	0	649,449	282
Missouri, Iowa, Nebraska	10	4	115	0	6	0	9	1	0	0	19,376	8
Oklahoma	252	141	52,137	33	78	7	46	128	70	1	1,009,122	539
Texas:												
North Texas	131	68	19,321	2	61	15	57	33	26	0	395,464	103
West Central Texas	35	13	3,954	3	19	1	20	14	0	0	86,149	54
West Texas	142	124	66,912	3	15	0	13	64	64	1	688,289	472
Texas Panhandle	41	28	3,446	10	3	0	1	40	0	0	128,911	135
Eastern Texas	31	15	2,845	1	15	0	3	5	23	0	197,740	89
Upper Gulf Coast	74	34	5,868	10	30	1	3	10	55	5	506,548	113
Lower Gulf Coast	58	27	4,474	6	25	0	0	4	52	2	412,358	95
S. C. Texas (San Antonio)	6	0	0	0	6	0	2	3	1	0	18,341	16
South Texas (Laredo)	34	15	1,564	5	14	0	14	14	6	0	118,034	98
Total Texas	552	324	108,384	40	188	17	113	187	227	8	2,551,834	1,186
Louisiana:												
North Louisiana	36	13	3,938	13	10	3	10	8	15	0	168,868	93
South Louisiana	35	20	6,484	2	13	0	0	1	17	17	334,525	117
Total Louisiana	71	33	10,422	15	23	3	10	9	32	17	503,393	186
Arkansas	18	13	3,194	0	5	0	2	7	9	0	94,308	40
Mississippi	14	9	2,272	0	5	0	0	5	9	0	69,679	63
Ala., Ga., Florida	13	2	100	0	11	2	1	4	4	2	64,571	16
Montana	36	18	2,201	3	15	0	18	15	3	0	97,469	124
Wyoming	19	14	5,881	1	4	0	0	14	5	0	81,356	100
Colorado	6	4	1,131	0	2	0	0	0	6	0	36,632	29
New Mexico	38	28	4,486	0	10	1	10	26	1	0	127,134	106
California	193	165	33,667	9	19	9	53	95	32	4	707,420	281
Total September	2,520	1,357	302,956	289	†874	162	936	987	403	32	8,119,410	4,340
Total August	2,305	1,200	256,707	191	‡914	163	905	836	365	36	7,333,328	4,132

*Five weeks ending September 30. †Includes 184 service wells. ‡Includes 250 service wells.

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WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Oct. 21, 1944					Cumulative total, 1944				
	Oil	Dist.	Gas	Dry	Tot.	Oil	Dist.	Gas	Dry	Tot.
Ohio	0	0	0	1	1	2	0	17	58	77
Indiana	0	0	0	0	0	4	0	0	20	24
Illinois	0	0	0	7	7	27	0	0	254	281
Kentucky	0	0	0	1	1	13	0	0	72	85
Michigan	0	0	0	5	5	12	0	3	197	212
Kansas	2	0	0	10	12	45	0	9	357	411
Nebraska-Missouri-Iowa	0	0	0	1	1	1	0	0	14	15
Oklahoma	2	1	0	2	5	58	1	20	221	300
Texas:										
North Central	0	0	0	5	5	53	0	1	253	307
West	1	0	0	7	8	38	0	3	145	186
Panhandle	0	0	0	1	1	0	0	2	9	11
Eastern	0	0	0	1	1	5	0	3	102	110
Gulf Coast	0	0	0	0	0	30	12	13	188	243
Southwest	1	0	0	7	8	20	4	14	197	235
Total Texas	2	0	0	21	23	146	16	36	894	1,092
Louisiana:										
Northern	0	0	0	4	4	4	0	1	50	55
Southern	1	0	0	1	2	8	6	0	39	53
Total Louisiana	1	0	0	5	6	12	6	1	89	108
Arkansas	0	0	0	2	2	2	1	0	49	52
Mississippi	0	0	0	1	1	3	0	0	55	58
Alabama-Georgia-Florida	0	0	0	1	1	2	0	0	25	27
Montana	0	0	0	2	2	3	0	4	39	46
Wyoming	1	0	0	0	1	15	0	1	18	34
Colorado-Utah	0	0	0	0	0	3	0	1	24	28
New Mexico	0	0	0	0	0	6	0	3	47	56
California	0	0	0	5	5	6	0	8	154	168
Total United States	8	1	0	64	73	360	24	103	2,587	3,074
Total previous week	12	0	5	62	79					

Three Price Groups Fixed For Natural Gasoline

WASHINGTON. — Details concerning the new ceiling prices for natural gasoline recently announced by Office of Price Administration for producers and resellers reveal that three groups of ceilings are established. These new ceilings, effective October 23, by Amendment 19 to MPR 88, will result in a few changes in such individual prices as vary from the general already existing. The three groups follow:

1. Dollar-and-cent ceilings f.o.b. plants in seven southern and middle western states on shipments to the 17 eastern states and the District of Columbia comprising Petroleum Administration for War District 1. Where shipments are made from Oklahoma and the Breckenridge, Tex., area, however, the spelled-out ceilings apply for all destinations. Ceilings are listed for eight different vapor pressures. They are in seven tables, depending on point of shipment, and are as follows in cents per gallon:

Vapor pressure	Oklahoma (to any destination)	Breckenridge, Texas area (to any destination)	East Texas, S. Arkansas, N. Louisiana	Central Illinois	Kansas except Kansas City area	Texas Panhandle	W. Texas, N. Texas, Lea County, New Mexico
26	4.75	4.50	5.16	6.00	4.88	4.59	4.50
24	4.99	4.72	5.38	6.24	5.12	4.83	4.72
22	5.22	4.95	5.61	6.47	5.35	5.06	4.95
20	5.46	5.17	5.83	6.71	5.59	5.30	5.17
18	5.70	5.40	6.06	6.95	5.83	5.54	5.40
16	5.94	5.62	6.28	7.19	6.07	5.78	5.62
14	6.46	6.12	6.78	7.71	6.59	6.30	6.12
12	6.89	6.52	7.18	8.14	7.02	6.73	6.52

Where the vapor pressure is different from the eight specified pressures, the ceiling price shall be proportionate between the maximum prices for the next higher and next lower pressures. When mutually agreeable, a buyer and seller may allow a tolerance not to exceed 0.5 lb. above and below the specified pressure without making such adjustment.

2. Formula ceilings, delivered at destination, on shipments made from District 2 (Middle West) except Kentucky, or District 3 (Southwest and Gulf Coast) to points within those districts or within District 4 (Rocky Mountain area).

Refiners determine their ceilings by using the lower of the following: (1) The sum of the maximum price for natural gasoline f.o.b. Oklahoma shipping points, plus the applicable October 1, 1941, rail rate of freight from Tulsa to the particular destination, or (2) the sum of the maximum price for natural gasoline f.o.b. shipping point in the Breckenridge, Tex., area, plus the applicable October 1, 1941, rail rate of freight from Breckenridge to the particular destination. An eligible marketer may add ⅛ cent a gallon. An eligible marketer is one in the business of marketing or acting as broker for petroleum products and who maintained an office for either of these purposes in the 60-day period preceding January 15, 1944.

3. Formula ceilings for delivered-at-destination maximum prices, on deliveries by pipe line from any Texas or Louisiana Gulf Coast port into a purchaser's storage facilities, and formula ceilings for bulk lots loaded into transportation facilities (tankers, barges, tank cars, etc.) f.o.b. terminals in Texas and Louisiana Gulf Coast ports. Ceilings for these two types of sales are determined in the same manner plus 0.25 cent per gallon to cover storage.

Argentina Moves to Build Republic's Oil Reserves

BUENOS AIRES.—A detailed geological and geophysical survey is contemplated by the Yacimientos Petroliferos Fiscales, Argentine Government oil company, in the province of Cordoba, in an effort to build up the nation's petroleum reserves. Some equipment already has been moved in for a test well. Lack of material for new development work and reduced importations of fuel oil are said to have resulted in an acute shortage of petroleum.

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Among the Drilling Contractors

R. & G. Drilling Co., recently organized by Clarence Raley and O. D. Gaiser, has started work on its first well at Elk Hills, in California. Contracts have been signed for several additional wells in the hills.

Severns Drilling Co., composed of R. D. Fisher, Clayton Severns, and Ashley De Witt, has been very active during the past several months, the company's most successful completion being a large well for Tide Water Associated Oil Co. in the Gosford district in California, where a new field has been discovered. Severns is also drilling for Tide Water Associated in the North Mountain View area where a new accumulation was found a few months ago.

K. and K. Drilling Co. of Vermilion and Edmonton, Canada, has contract for Iscris M 2, LSD 8, 2-54-6w4 in the Rusylvia area 20 miles north of Vermilion. Iscris M 1 in the same area got good oil shows in the Devonian.

Glen Boller, of Calgary, Alta., has spudded Phillips Petroleum (U.S.), 1, LSD 3, 22-18-5w5, on the Sullivan Creek structure in the Alberta foothills south and west of Turner Valley.

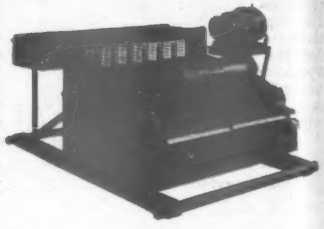
Rine Drilling Co. has the contract on the Lion Oil Refining Co. 1 Allen, wildcat test in NW NE NE 2-30-14w, northwest Barber County, Kansas. Location is about 2½ miles southwest of the Coats pool of southwest Pratt County.

Thomas H. Allen, drilling contractor and operator of Wichita, is drilling a wildcat at 1 Monroe, in SW SW SW, 8-11-21w, about 10 miles east of the Wakeeney pool in northeast Trego County, Kansas.

Bodine Drilling Co. has drilling contract on the Skelly Oil Co. 1 James, a wildcat in NE NE NE 25-16-29w, Lane County, Kansas, about 16 miles northwest of the Aldrich pool of Ness County.

Parker Drilling Co., Tulsa, has been awarded drilling contracts on three wells to be drilled by Lawrence C. Hay and F. G. Holl, oper-

McNEELY VIBRATING MUD SCREEN



Handles the output from 20" mud pumps after surface hole is drilled. Average capacity 650 gallons per minute. Completely unitized. Screening surface—16 square feet. Domestic shipping weight less drive—1600 pounds. Headroom—27 inches. See Composite Catalog or write for details.

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You apply RECTORSEAL directly from the container with brush or swab. No mixing necessary. Use it on all threaded, coupled, or gasket connections. RECTORSEAL is insoluble in all petroleum products. The perfect seal for oil, gas, steam, mud and water line connections . . . also casing and tubing collars.

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Fort Worth National Bank Bldg.,
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THE POSITIVE LEAK PREVENTER

PENBERTHY
"REFLEX"
WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

ators of Wichita, in the Shallow Water pool of Scott County, Kansas, where they have recently completed a Mississippi lime oil well in CS½ SE SE 10-20-33w. The first of the new tests will be the 1 Minnie Dague, in CSL SW NE 14. Locations for the other two will be made following completion of the Dague well.

Minimum Octane Set for Premium-Priced Gasoline

WASHINGTON.—Gasoline sold at service stations and other retail outlets at ceiling prices established for premium grade must meet a minimum octane specification, the Office of Price Administration announced. This action, effective October 24, was taken to protect buyers from any attempts to sell lower grade gasolines at the higher ceilings established for premium grade.

To qualify for the ceilings on premium grade, which are usually up to 2 cents a gallon over the ceilings for regular grade, the gasoline must have a minimum octane number of 75 A.S.T.M.

At the present time, the Petroleum Administration for War does not permit the manufacture of gasoline for distribution in civilian commercial channels as premium grade to exceed 76 octane. Consequently, premium grade gasoline at the retail level should have an octane rating from 75 to 76. Prior to the war, premium grade octane rating was generally recognized by the industry as a minimum of 80.

WSA Approves Payment For Tanker Loss

WASHINGTON.—The War Shipping Administration has approved payment of $2,776,803.79 to Keystone Tankship Corp., Philadelphia, for the loss of its tanker Seakay, of 11,335 gross tons, while in war service. While carrying a full cargo of vapor oil and military supplies, the Seakay was set afire in mid-Atlantic several months ago when a torpedo crashed into her hull. Only one man out of 80 merchant seamen and Navy gunners was lost. The vessel was built in 1939 at the Chester (Pa.) yard of Sun Shipbuilding and Dry Dock Co.

CALENDAR

November

A.P.I., annual directors meeting, Statler Hotel, Washington, D. C., November 7.

S.A.E., national fuels and lubricants conference, Mayo Hotel, Tulsa, November 9-10.

A.C.S., third national chemical exposition, Coliseum, Chicago, November 15 to 19.

WEB WILSON
Rotary Tongs

See pages 3101 to 3120 of Composite Catalog

MEDIUM SERVICE TYPE B

Meets the need for a lighter, shorter Tong for regular rigs and the heavy, portable or Blitz rigs. Strong, fast, easily operated and safe for the worker.

Put this WEB WILSON Tong on your rigs and be convinced.

WEB WILSON
Oil Tools
W. W. WILSON BUILDING
HUNTINGTON PARK, CALIF.

Don't Get Caught Without One!

No. 310-A, 15-tons capacity, 22" high, 14" lift, 2¼" minimum toe lift.

This Simplex Emergency Jack has provided the answer to many emergencies, and has also served for years as an all-around jack in the oil fields. It safely lifts, lowers, pushes or pulls at any angle; tilting on its hinged base for angle jacking. Ask your field store.

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LEVER - SCREW - HYDRAULIC
Jacks
Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

PERSONALS

Fuqua Assistant to Vice President Of Gulf

H B. FUQUA, district chief geologist at Fort Worth for Gulf Oil Corp. since 1929 and recently named assistant to Vice President Joseph H. Russell, in Houston, has been in Gulf service a little over 22 years. Before that he had worked for several important oil companies, besides doing consulting work, following his graduation from University of Oklahoma, where he majored in geology.

Fuqua joined Gulf in February 1922 as a geologist at Wichita Falls, Tex. He was transferred to Fort Worth in November 1926 and 2 years later was promoted to district chief geologist there. He is a past president of American Association of Petroleum Geologists.

Lewis F. Busey, head well puller for Shell Oil Co., Inc., at Bakersfield, Calif., has been promoted to assistant production foreman. **Horace W. Hindry,** field engineer in Canada, has been made district foreman at Bakersfield.

Capt. W. B. Armstrong, formerly a geologist for Mid-Continent Petroleum Corp., Tulsa, recently was awarded the Bronze Star Medal for his part in the battle of Rome.

Thomas J. Garin, Jamestown, N. Y., has been engaged as director of information by Pennsylvania Grade Crude Oil Association. Garin, a graduate of St. Bonaventure College, was formerly oil editor of the Bradford (Pa.) Era and after that copy editor for the Federal Register, Washington.

Col. R. B. Harkness, natural-gas commissioner for Ontario, recently returned from active service overseas, and has resumed his duties in the Ontario Mines Department.

Maj. Lyman M. Lyon, formerly senior petroleum engineer in the production department of The Carter Oil Co., Tulsa, was serving with an antiaircraft battalion in New Guinea when heard from recently.

W. C. Kimball, who was chief scout for Phillips Petroleum Co. in the West Texas and Southeast New Mexico district, has been made title man in the land department, taking over the work formerly handled by **Amos Alexander.** The scouting work will be done by **H. L. Pycatt** and **T. A. Fraser.**

D. B. Hodges has returned to his post as manager of transportation and supplies for Shell Oil Co., Inc., in New York after a leave of absence during which he served as associate director of the supply and transportation division of Petroleum Administration for War. Hodges, who attended University of Nebraska, joined Shell as a clerk at Ventura, Calif., in 1926.

Thomas C. Frick, who was job analyst for The Atlantic Refining Co. in its southwestern division, has been made superintendent in East Texas.

Tom J. Murphy, Jr., is a new scout in Midland, Tex., for The Texas Co. He formerly was doing title work in the division headquarters in Fort Worth. He succeeds **E. H. Gaither,** who resigned to return to his old home in Glen Rose, Tex.

Howard S. Kunsman, formerly geologist for Barnsdall Oil Co. in the Oklahoma district, has opened an office as a consultant in Oklahoma City. He will specialize in geological supervision of well completions.

Maj. M. H. Champion, tank-car owner and transportation expert, has received a medical discharge from the Army and is back in Oklahoma City recovering from injuries of the back and neck inflicted by a bomb. He served in England and in the invasion of France.

Three Phillips Petroleum Co. transfers bring **William U. Stahl, Jr.,** from Tahoka, Tex.; **C. B. Bruton** from Hermosa Beach, Calif., and **Turner P. Burgess,** from Lawrence, Kans., all to Oklahoma City.

Hoc Clark, California divisional manager for Pure Oil Co., is rapidly recoverying his health at Bakersfield after suffering injuries in an automobile accident.

C. E. (Tex) Pilgrim, who recently reentered employ of Standard Oil Co. of California, has left for Colombia to drill for the company. **Dan Boone** has also left his California home en route back to Arabia where he is employed by Standard of California.

Frank Fueller, of Barnsdall Oil Co., with offices in Los Angeles, has been appointed manager of the land department succeeding **John E. MacMillan,** who recently resigned to take a position with Fullerton Oil Co.

George J. Hanks, president South Penn Oil Co.; **Earl K. Smith,** Smith-Newton Oil Co., Bradford, and **Howard J. King,** field superintendent South Penn Natural Gas Co., Parkersburg, W. Va., have been chosen directors of Pennsylvania Grade Crude Oil Association.

Arthur V. Danner and **Robert B. Cragin,** who have served the Petroleum Administration for War in the

DANNER

CRAGIN

refining division for 2½ and 3 years, respectively, have been elected vice presidents of the Houdry Process Corp. Danner becomes executive vice president and Cragin will be in

charge of engineering sales. Formerly, Danner was patent attorney for Socony-Vacuum and Cragin was director of petroleum research and sales engineer for M. W. Kellogg Co.

W. H. Fletcher and **Henry Jatzek** have been promoted to general foremen in No. 1 refinery of The Standard Oil Co. of Ohio, in Cleveland. Fletcher, an engineering graduate from University of Cincinnati, joined the company in 1937 as a surveyor in the pipe-line department, was transferred to No. 1 refinery as an engineer in 1941, and 2 years later was advanced to assistant master mechanic. Jatzek joined the company in 1928 as a welder, and in 1939 he was made a welding foreman. Meantime he completed courses in petroleum refining and foremanship. **Ralph B. Kilgore** and **M. A. Pappas** have been appointed area engineers. Kilgore, an engineering graduate of Southern Methodist University, was a senior engineer in the general engineering division. Pappas, who graduated as a chemical engineer from Columbia University, had been doing special work in No. 1 refinery.

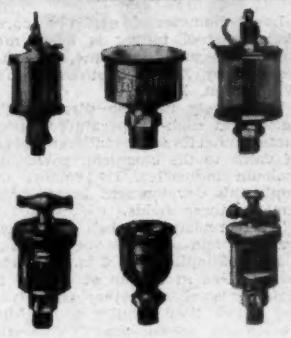
H. W. Penterman, head of the land department in the Mid-Continent area for Shell Oil Co., Inc., has been designated as acting vice president when **Ralph B. Roark,** area vice president, is away. **Sherwood Buckstaff,** geologist, has been named manager of the geological and exploratory department, succeeding **R. S. Shutt,** whose resignation becomes effective November 1.

Howard Holmes, Dallas, new president of the American Association of Oilwell Drilling Contractors, and **Howard J. Whitehill,** Tulsa, new president of the National Stripper Well Association, have been appointed as ex officio members of the Petroleum Industry War Council.

C. L. Perkins has become vice president and general superintendent, El Paso Natural Gas Co. He has been promoted from the position of assistant to **A. L. Forbes, Jr.,** who resigned as general superintendent of the El Paso company in order to devote his attention to the operation of Pressure Weld Co. of which he is vice president and general manager. Forbes continues in the office of vice president of El Paso Natural Gas Co., which he has held for several years.

E. B. Roudebush, formerly a scout for Gulf Refining Co. in the Illinois basin area, is reported to be serving as technical sergeant with an engineering battalion in Holland.

PENBERTHY
LUBRICATING DEVICES



Glass body oilers, sight feed lubricators. Plain oil and grease cups, spring compression and screw plunger grease cups, engine lubricators . . . these are among the Penberthy lubricating devices that are so widely used in the oil industry because they have always been dependable under the most severe conditions.

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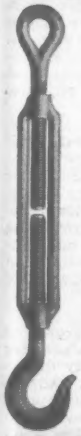
TOUGH and TRUE
TURNBUCKLES
by Norris Brothers, Inc.

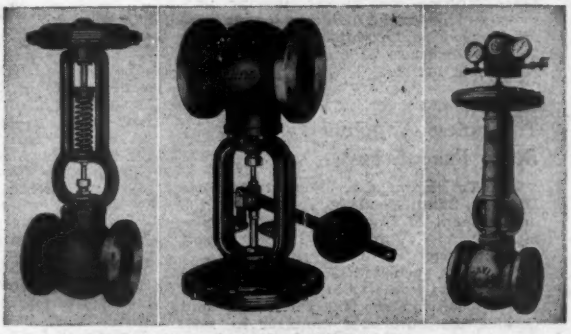


HUNDREDS OF THOUSANDS IN USE ALL OVER THE WORLD . . .

• Norris Brothers Turnbuckles are made perfectly true by a special straightening process. Ends are tapped in line, assuring true concentric pull. And as for toughness, we've turned them inside out and twisted them into a pigtail braid without a sign of fracture. Made in sizes and types to fit most needs. Ask your supplier, or write for circular.

Norris Brothers, INC.
ROBINSON · ILLINOIS

NO JOB FOR PRESSURE REGULATORS THAT CAN'T BE HANDLED BY DAVIS



No. 14 *(left) Davis Spring-Loaded Regulator*
No. 16 *(center) Davis Balanced Diaphragm-Type Regulator*
No. 401 *(right) Davis Pilot-Operated Regulator*

STANDARD Davis Pressure Regulators are available to meet virtually any requirements. Some models are spring-loaded, others weight-loaded, depending upon which best serves the valve design and application. Because operating conditions vary so greatly, careful selection of the right regulator for the job is of extreme importance. His job, however, is greatly simplified when you specify Davis, for there ar eighteen different types to choose from—sizes up to 24"—for pressures up to 1500 lbs. And—Davis provides experienced engineering cooperation, informative literature and a handy "Service Selector Chart" to aid you. Write today.

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DISTRIBUTOR: Westcott & Greis, Inc., Tulsa, Dallas and Houston

Industrial Items

New Long Bent Corrugated Flexible Connectors

Large-diameter flexible corrugated stainless steel tubing is being manufactured, for the first time, in long bent lengths, by Zallea Brothers & Johnson, Wilmington, Del.

Extensively used on diesel engine exhaust and high-temperature vapor lines, these connectors have inherent advantages of value to the chemical, power and petroleum industries. It remains only to apply this development to existing problems in these fields.

The connectors absorb expansion, contraction and extreme deflection in all planes. Supplied in 6-in. diameter and larger sizes in carbon steel, any type of stainless steel and other corrosive-resistant alloys, they require no packing and, having no seams, are permanently gas tight. The connectors handle corrosive liquids and gases under pressures up to 30 p.s.i. and at temperatures from subzero to 1,800° F. Connectors for absorbing linear expansion only can be furnished for pressures up to 300 p.s.i.

Fluorescent Light for Inspection Of Drums and Barrels

A fluorescent light 1½ in. in diameter designed for inspection of drums and barrels when bungholes afford the only means of access is now being marketed by Day-Ray Products, Inc., South Pasadena, Calif.

The Day-Ray barrel inspection light is available in 6 and 8-watt sizes for operation on 60-cycle, 120-volt circuits. Lighting element is a regular Mazda fluorescent bulb, enclosed in plastic tube for insulation. Gasketed between removable caps and plastic housing, cord is sealed by brass bushing and gasket, making unit moistureproof and capable of burning for long periods under water. Over-all length is from 29 in. to 32 in., including 18-in. removable handle.

Torrington Appoints Sales Executives

The Torrington Co., Bantam Bearings Division, South Bend, Ind., announces the appointment of Harold C. Olson as sales manager and John A. Toth as assistant sales manager.

Olson has been with the company since 1935. He was formerly district representative in Milwaukee and Pittsburgh and became assistant sales manager in 1941. Toth has been associated with Torrington since 1929. Also at one time Pittsburgh representative, he was special representative in the steel industry before his present appointment.

New Flow Splitting Device

A new flow splitter, called the Micro-Rotaweir, is available to accurately divide a liquid flow into two streams. The proportions of the flow division may be varied at will by adjusting an outside level and pointer to the percentage desired, as indicated by an external scale. The item is manufactured by Fischer & Porter Co., Hatboro, Pa.

The Micro-weir may be obtained with fittings in all metals. The shell may be either metal, or Pyrex glass. For high-melting fluids the metal shell may be lagged and steam-heating coils placed inside the Rotaweir.

The Micro-Rotaweir will handle flows from 30 g.p.h. to 900 g.p.h. Sizes up to 15,000 g.p.h. are also contemplated.

The Micro-Rotaweir has been used for the following operations: (a) Proportioning product to reflux on small pilot-plant stills; (b) dividing liquid flow to twin absorbing units, cooling towers or other reactance vessels operating in parallel; (c) flow splitting for liquid blending and flows to storage tanks.

Briggs Announces Addition of New Series to Standard Line

Briggs Clarifier Co., Washington, D. C., announces the addition of a new series to its standard line. Known as ZR series, these clarifiers are designed for the continuous filtration of soluble oils, low-viscosity cutting oils and kerosene used in precision grinding, honing, light broaching, milling and lathe work.

Ratings are based on 3 g.p.m. flow through each refill in order to obtain a useful refill life of 100 to 150 hours. The filters can be installed on either unit machines or in central systems. The size of the filter depends on the actual flow rate of the coolant.

The refill assembly consists of a refill element, center tube and end clamps. The refill element is preformed at each end to fit the outside diameter of the center tube which in turn is inserted into the filter case. Clamps are placed over each end and taken up as tightly as possible.

The Z fold refill cartridge is manufactured of specially treated ribbed cellulose and constructed of one or two layers in either 22 or 30 folds to over-all dimensions of 5 in. o.d. by 18 in. long.

Le Roi Co. Opens New Sales Office in Birmingham

Le Roi Co., Milwaukee, has established a new sales office in Birmingham, Ala. Headed by C. B. Hall as manager, this new office, in the Martin Building, will serve the entire southeastern United States territory. Hall has represented that company for more than 10 years in various sales and service capacities.

Herndon Named by Tube Turns

Tube Turns, Inc., Louisville, announces the appointment of Ches Herndon as manager of the company's Houston branch with offices in the Commerce Building. A native of St. Louis, Herndon's associations with supply firms in the Southwest dates from 1926. He was with Hanlon-Waters, Inc., in Tulsa for 13 years.

Werey Heads Conoflow

R. B. Werey has been elected president of the newly organized Conoflow Corp. with offices and manufacturing facilities at 2100 Arch Street, Philadelphia.

Conoflow Corp. manufactures and markets devices for the regulation and control of flow such as automatic and manual control valves, diaphragm motors and fluid regulators.

Oil Well Publishes House Organ

The history of Oil Well Supply Co. is contained in the first edition of the company's new employe magazine, "Oilwell" News. Virginia Gulledge, Dallas, is editor-in-chief of the publication; R. F. Smalley, J. B. Creen and Kenton Chickering, associate editors; Agnes Farmer, art editor.

Brown Instrument Cited For Security Measures

The National Security Award has been received by Brown Instrument Co. for outstanding wartime security measures. Official presentation of the certificate of award and OCD pennant was made during ceremonies held in Philadelphia October 27. E. B. Evleth, vice president and general manager of the Brown company, a division of Minneapolis-Honeywell Regulator Co., accepted the certificate of award.

Wickwire Spencer's Purchasing Department Moves to Buffalo

Wickwire Spencer Steel Co. has announced that the purchasing department will be located at River Road, Buffalo. The purchasing department has been previously located at 500 Fifth Avenue, New York.

Oil Well Promotes Three

Announcement of the transfer of Albert R. Zelt, ranking vice president of Oil Well Supply Co., from Oil City, Pa., to Dallas, has been made by Fred F. Murray, president. Promotions for two other members of the company were announced at the same time. Ralph W. Rager was named comptroller, and Byron Hinderer was named assistant comptroller.

Mr. Zelt, 44, formerly was vice president of Oil Well Supply Co. in charge of manufacturing, with headquarters in Oil City, Pa. He is a member of the American Petroleum Institute.

Trade Literature

Builders-Providence, Inc., Providence, R. I.—Bulletin 349, describing the Shuntflo meters. The bulletin is replete with diagrams, photographs and tables.

Tube Turns, Inc., Louisville.—A 20-page booklet giving allowable working pressures for welding fittings in five classes of piping—power, oil, district heating, gas and air, and refrigeration. Fourteen convenient tables list allowable pressures at the indicated temperatures for any size and weight Tube Turn fitting.

Athey Truss Wheel Co., 5631 West Sixty-fifth Street, Chicago.—A six-page folder entitled "To Help You Maintain Better Highways," featuring the Athey force-feed leader. The folder illustrates time-and-labor-saving methods of removing and salvaging surplus materials on highway maintenance and construction through the use of the new self-propelled leader.

H. K. Porter Co., Inc., of Pittsburgh, and its divisions, J. P. Device Manufacturing Co., and Quimby Pump Co.—Forty different categories of process items, ranging from the smallest agitator to huge process vessels, are listed, with many illustrations, in this first catalog illustrating the combined resources of these three companies.

Caterpillar Tractor Co., Peoria, Ill.—A 32-page booklet picturing some of the tasks the company's diesel engines are doing on the home front.